REPORT RESUMES

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SPACE AND UTILIZATION STANDARDS, CALIFORNIA PUBLIC HIGHER EDUCATION.

BY- MATSLER, FRANKLIN G. AND OTHERS
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IN LONG RANGE FACILITIES PLANNING, SPACE UTILIZATION STANDARDS ARE NEEDED WHICH 1) ALLOW MAXIMUM FLEXIBILITY, 2) ARE EQUITABLE FOR ALL SEGMENTS OF HIGHER EDUCATION WHEN THESE SEGMENTS ARE CONCERNED WITH THE SAME LEVELS OF INSTRUCTION AND THE SAME SUBJECT FIELD AREAS, AND 3) ARE CONTINUALLY REVIEWED. FACTORS IN DETERMINING STANDARDS ARE 1) ROOM USE IN TERMS OF HOURS PER WEEK, 2) PERCENT OF STATION OCCUPANCY WHEN ROOMS ARE IN USE, AND 3) SPACE PER STUDENT. STANDARDS AND THE RATIONALE FOR THEIR DEVELOPMENT ARE PRESENTED FOR CLASSROOMS AND LABORATORIES, OFFICES, AND LIBRARY FACILITIES OF ALL TYPES. (WO)

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SPACE and UTILIZATION STANDARDS, CALIFORNIA PUBLIC HIGHER EDUCATION

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Number 1027
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SPACE and UTILIZATION STANDARDS, CALIFORNIA PUBLIC HIGHER EDUCATION

A REPORT TO THE
COORDINATING COUNCIL FOR HIGHER EDUCATION

Prepared by
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and
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SACRAMENTO
SEPTEMBER 1966

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PREFACE

The continued increase in enrollments in California Higher Education over the past 15 years has brought about an unprecedented need for new construction over the same period of time. With this increased growth came strong pressures from the university, state colleges, and junior colleges as well as governmental agencies to insure that the physical facilities were being utilized efficiently. As a result, California has been a pioneer among the states in the area of utilization standards and capital outlay planning. The *Restudy* space and utilization standards, developed in 1955, have been used extensively throughout the state and in other parts of the United States as well.[1] However, as the demands for increased state support for capital costs continued in the two public four-year segments the pressure to furnish additional state money to the junior colleges also increased. One of the recommendations of the 1960 *Master Plan* provided that the new coordinating agency conduct a utilization study of the facilities of all three public segments of higher education with the intent of modifying existing standards if appropriate. In accordance with this provision the council staff, together with the staffs of the three public segments, inventoried all of the nonresidential space of all public institutions for the 1963–1964 academic year. Early in 1965 a progress report was published containing summary data of the 40 million plus square feet of floorspace in the three segments, and included the utilization rates for each of the 90 campuses studied.[2] The data from this report together with additional, more current information from the segments were used to make the final recommendations for the standards.

The committee which advised the council staff and aided in the collection of the data was entitled the Facilities Standards Committee. Members included Gerald Cresci and Archie McPherran from the State Department of Education; Arthur Hall and Harry Harmon from the California State Colleges; Robert Harris, Department of Finance; John Keller and Robert Walen from the University of California; and N. B. Keller and Jerome Evans from the Legislative Analyst's office. Other participants in the study included Weston Alt, Manual Brilliant, Dale Flemming, Elwood Lehman, Donovan Smith, Eugene Portugal, Russell Thompson and G. H. Womble.

CCHE staff members participating in the study included Charles McIntyre, Theodora Thayer, Courtland Washburn and Frank Matsler. Associate Director Alvin Marks chaired the meetings. Dr. Marks and Mr. John M. Smart edited the report.

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[1] T. R. McConnell, T. C. Holy and H. H. Semans, *A Restudy of the Needs of California in Higher Education,* California State Department of Education, Sacramento, 1955.

[2] CCHE, *A Progress Report on the Study of Utilization of Physical Facilities of California's Public Institutions of Higher Education, 1963–64*. No. 65-2A, February 15, 1965.

RECOMMENDATIONS OF THE COUNCIL

(Approved September 27, 1966)

Space and Utilization Standards

Whereas, Utilization and space standards for the same levels of instruction and subject field areas should be equitable for all segments of public higher education in California and such standards should allow for a maximum of flexibility within the limits of efficient operation; and

Whereas, The standards should reflect a high rate of expected utilization and, overall, should not fall below the 1955 *Restudy* standards as they have been applied by the Department of Finance; and

Whereas, Standards are necessary in the equitable apportionment of state funds for capital outlay purposes and in the development of five-year capital outlay programs in the three segments; and

Whereas, Standards should not be applied to new capital outlay projects building by building but on a campuswide basis; and

Whereas, New standards should not be arbitrarily imposed to the extent that existing programs are impaired; now, therefore, be it

Resolved, That the State Board of Education, the State Department of Finance, the Trustees of the California State Colleges and the Regents of the University of California be advised that the utilization and space standards shown on Table 2 be used in programming capital outlay on a campuswide basis in the three public segments; and be it further

Resolved, That when it is determined that these new standards will have an immediate impact of drastically decreasing or increasing computed student capacity at any institution that these standards should be phased in over a period of time; and be it further

Resolved, That the staff of the Coordinating Council for Higher Education, together with the three segments continue to review and conduct a comprehensive reevaluation of these standards based on fall 1966 data for report to the council by fall 1967. In the review of these standards attention should be given to total costs including operating costs as distinguished from capital outlay costs alone.

Junior College Office Standards

Whereas, There are no official space standards for planning faculty and administrative offices in the public California junior colleges, and it will be necessary for state agencies, in the administration of both state and federal capital outlay programs, to review and approve projects which will include such office space; now, therefore, be it

Resolved, That the State Board of Education and the State Department of Finance be advised that an appropriate space allocation for all office space (academic offices, administrative and clerical offices, office service rooms and conference rooms) should be established at 140 assignable square feet for each full-time equivalent instructional staff member in colleges of 1,000 full-time students or more, and that the standard be established at 160 assignable square feet for each full-time equivalent instructional staff member in colleges of less than 1,000 full-time students.

Junior College Library Physical Plant Standards

Whereas, There are no official space standards for planning library facilities in the public California junior colleges, and it will be necessary for state agencies, in the administration of both state and federal capital outlay programs, to review and approve projects which will include totally or in part such library facilities; now, therefore, be it

Resolved, That the State Board of Education and the State Department of Finance be advised that the following guidelines should be considered in planning space provisions for junior college library functions: (1) 0.10 assignable square foot[1] per volume for housing the library collection; (2) reading stations for 15 percent to 20 percent of full-time enrollment depending upon the relative emphasis in trade and technical instruction, with 25 assignable square feet provided for each station; and (3) a basic complement of 400 assignable square feet plus 140 assignable square feet per full-time equivalent staff member for library service needs; plus additional areas (sized for individual needs) for audiovisual and programmed learning activities if they are to be housed in the library facility.

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[1] The assignable square feet includes those areas which are "usable" for the functions described. Not included in this usable category would be such areas as the main lobby (excluding card catalogue area), elevators, stairs, walled corridors, restrooms, and areas accommodating building maintenance services.

TABLE 2*

Assignable Square Feet per Station and per 100 Weekly Student Contact Hours, 8–5, California Public Segments of Higher Education

LABORATORIES

Subject field area	ASF/ stn.	ASF/100 WSCH[a] ASF/stn. ÷ Hrs. wk. × stn. occ. × 100
Life sciences		
Agriculture		
Lower division	60	280
Upper division	60	375
Biological sciences		
Lower division	55	260
Upper division	60	375
MPE sciences		
Physical sciences		
Lower division	60	280
Upper division	70	440
Mathematical sciences		
Lower division	30	140
Upper division	30	190
Engineering sciences		
Lower division	90	425
Upper division	110	690
Social sciences		
Psychology		
Lower division	40	190
Upper division	60	375
All other social sciences		
Lower division	30	140
Upper division	30	190
Humanities		
Art		
Lower division	65	305
Upper division	65	405
Other humanities		
Lower division	40	190
Upper division	40	250
Professions (U.C. & C.S.C.)		
Business administrations		
Lower division	30	140
Upper division	30	190
Education		
Lower division	--	---
Upper division	40	250
Home economics		
Lower division	60	280
Upper division	60	375
Journalism		
Lower division	60	280
Upper division	60	375
Health sciences		
Lower division	--	---
Upper division	50	315
Junior college classifications		
Agriculture	150	705
Business	*30*	*140*
Home economics	60	280
Applied graphic arts	80	375
Health services	50	235
Public personnel service	50	235
Aero. technology	175	820
Air conditioning	130	610
Building trades	175	820
Ceramic technology	40	190
Chem. technology	70	330
Drafting technology	60	280
Electrical technology	70	330
Electromechanical	100	470
Electronic technology	60	280
Engin. Gen.	90	425
Engineering technology	70	330
Industrial technology	75	350
Mechanical—Auto	200	940
Metallurgical technology	65	305
Metal trades	130	610
Textile technology	120	565
Welding	90	425
Other trade technology	75	352

* NOTE: This table supersedes Table 2 found in CCHE document 66-11 dated May 24, 1966.

Assignable Square Feet per Station and per 100 Weekly Student Contact Hours, 8–5, California Public Segments of Higher Education

CLASSROOMS AND SEMINARS

ASF/stn. = 15 sq. ft.
ASF/100 WSCH = 67 sq. ft.

Utilization components for space standards computation

	Hrs./wk.		Stn. occ. %		Stn. use
Classrooms and seminars	34	×	.66	=	22.4
Laboratories:					
Lower division	25	×	.85	=	21.3
Upper division	20	×	.80	=	16.0

Abbreviations

ASF/stn. = Assignable square feet per student station.
Hrs/wk. = Number of hours out of a 45-hour week, 8 a.m. to 5 p.m. a classroom, or laboratory, on the average, should be used.
Stn. occ. = The percent of expected student station occupancy when rooms are in use.
Stn. use = The number of hours per week (out of the 45-hour week) which a student station, on the average, should be used.
WSCH = Weekly student contact hour.

Formula for deriving the standards

$$\frac{\text{ASF/stn.}}{\text{Hrs./wk.} \times \text{stn. occ.}} \times 100 = \text{ASF/100 WSCH}$$

Example A. For determining ASF/WSCH in classrooms and seminars.

ASF/stn. = 15
Hrs./wk. = 34
Stn./occ. = .66

$$\frac{15}{34 \times .66} \times 100 = 67 \text{ ASF/100 WSCH}$$

Example B. For determining ASF/WSCH in lower division biological science laboratory.

ASF/stn. = 55
Hrs./wk. = 25
Stn./occ. = .85

$$\frac{55}{25 \times .85} \times 100 = 260 \text{ ASF/100 WSCH}$$

SECTION I

THE NEED FOR SPACE STANDARDS

WHAT ARE SPACE STANDARDS AND WHY ARE THEY NEEDED?

There is a continual need in the planning of higher educational facilities to reconcile the space required for a particular program with the expected load. Space needs may be expressed in terms of classrooms and the load by the number of existing or expected students. On the other hand, the space in question may be library space and the load measured by the number of volumes, students in reading spaces, or staff working space. Other problems relative to the reconciliation of space and load are encountered in considering offices, research laboratories and other type facilities.

Standards may be used as rules of thumb wherein architects and planners can estimate total space needs on the basis of the expected load. Standards can also be used in estimating the efficiency of use in existing facilities. It may be asked why a campus should expand its number of classrooms if it is not utilizing its existing rooms to a proper degree. But, *what is* the proper degree of utilization of classrooms? Should utilization standards be about the same for all types of institution? All sizes?

Standards to be used in determining need must necessarily be established on an arbitrary basis. They may be based on average practice or some point on a scale where a certain percentage of the institutions lie. They can be based on a theoretical computation which might appear reasonable to persons sophisticated in facilities space planning. In any event, the imposition of new or revised standards on a group of institutions may cause some anguish to those who have an excess amount of space, but are still desirous of additional state support.

The standards recommended in this report are the result of an extensive utilization study of campuses in all three public segments conducted in 1963.[1] A number of committee meetings of technical experts in the field of utilization from the public segments, the Department of Finance, the Legislative Analyst's office and the State Department of Education were held to consider the findings of the study. Concensus was not obtained on all of the individual components that make up the final formula proposed in the recommendations. Judgment, therefore, had to be made on the basis of (1) existing space and utilization standards, (2) existing space and utilization practices, (3) advice from specialists, architects and planners relative to space per station data, and (4) advice from members of the Facilities Standards Committee.

The standards proposed in this report include:

1. Standards for classrooms and seminar rooms.
2. Standards for laboratories categorized into upper and graduate division, lower division and subject field area.
3. Office standards based on space per full-time instructional staff member.
4. Library facilities standards for junior colleges.

Also included in this report is a summary of existing library space in the four-year segments and the segments' currently used standards for planning. Not included in this study are any analyses of the specialized space needed for (1) research laboratories, (2) music facilities, and (3) physical education facilities.

BASIC ASSUMPTIONS

Basic assumptions underlying the proposed standards presented in this report are:

1. **The standards should allow maximum flexibility.** They should allow the individual campus planners and architects as much freedom in planning within the parameters of broad standards as is possible. Just as the program budget eliminates the necessity for line item review, so should the formula for determining space allocations eliminate detail such as number of stations, rooms, size of service areas and the like. Thus, a new project, as a chemistry building for an expected 500 chemistry students, should be scoped by determining, on the basis of a formula, the number of assignable square feet for the laboratories and the appurtenant areas, allowing the faculty and the planners the flexibility to determin the number and type of rooms as well as the sizes of such rooms, so long as the total falls within the allowable space for that number of students. An alternative for this flexible approach is to require justification, based on subjective criteria, for each type of room, for the number of student stations, etc., such justification oftentimes to be evaluated by persons in state agencies not familiar with the problems of teaching chemistry.

The basic student unit for measuring space needs in this study is the "weekly student contact hour." One weekly student contact hour (WSCH) is approximately a 50-minute period of time when one student is in a class and occupying a student station. If he is taking a lecture course for three credits he would normally be counted as three WSCH. He may also be taking a five-credit chemistry course requiring both laboratory and lecture-type instruction. A normal breakdown of these total weekly student contact hours would be: lecture WSCH, 3, and laboratory WSCH, 6. The total WSCH for this particular student and his one chemistry course would equal 9 for the five-credit course. The ratio of student credit hours to weekly student contact hours in this case would be 5:9. Thus, a planner can translate weekly student contact hours into student credit hours if he has one or the other of the two variables and the ratio for the particular subject field area.

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[1] CCHE, *A Progress Report on the Study of Utilization of Physical Facilities of California's Public Institutions of Higher Education, 1963–64*, Staff Report 65-2A, January 25, 1965.

2. **The standards, overall, should not be lowered below the "Restudy" standards.** The *Restudy*[1] standards, slightly modified in the case of the university and further modified and only partially used by the state colleges, have now been in existence for over 10 years. A downward modification of existing utilization standards by as little as only 5 percent would require a sudden (and, perhaps, artificial) need for over $2 million of construction money for the university alone if the interpretation of the 5 percent were to mean that the existing more than 1½ million square feet of instructional space in the university would have to be augmented to meet the new standards.[2]

The proposed standards herein have been developed with the idea that certain modifications within the existing standards should be made to meet the demands of changing teaching methods and realistic course scheduling. The overall standard is estimated to be slightly higher (i.e. more rigorous) than existing standards. A further explanation of the impact any changes will have on existing programs is presented later in the report.

3. **The standards should be equitable for all segments when concerned with the same levels of instruction and the same subject field areas.** It is assumed here that general purpose classrooms and seminar rooms should require about the same amount of space per student (actually, per weekly student contact hour) in one segment as in another, whether the planning is for upper, lower or graduate division students. The only exception to this that appeared to be warranted was in the small, isolated junior college which has been in existence for some time and cannot be expected to grow as rapidly as those campuses in metropolitan areas, yet which must offer certain basic programs in spite of the problem of poor utilization. All lower division laboratories within similar subject field areas in all three segments, however, are expected to require an equal amount of space and are expected to be utilized to about the same degree. Special space allowances are developed for the vocational and technical laboratories in the junior colleges; however, the degree of utilization in these laboratories is expected to equal that of all other lower division laboratories.

4. **Standards should be continually reviewed.** Space standards should be periodically reviewed to keep up with the changing times. New teaching techniques and practices, changing curriculum patterns and new technology cause changes in the requirements for space. The data gathered for this study consisted of enrollments, schedules and inventories for the fall of 1963. A new utilization study and a complete review of the space standards should be planned for fall 1968, five years after the reporting date for that study.

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[1] *Restudy of the Needs of California in Higher Education* (1955).

[2] Based on an estimate of $30 per square foot of additional space needed.

SECTION II

CAPITAL OUTLAY PLANNING IN THE FOUR-YEAR SEGMENTS

THE FIVE-YEAR CAPITAL OUTLAY PROGRAM

Capital outlay planning for the California State Colleges and the University of California is a continuous program, updated each year. These five-year plans take into account the capacity of existing facilities based on utilization and space standards and the expected increase in students over the period (enrollment projections are developed jointly by the Department of Finance and the segments). On the large, growing campuses, buildings are coming on the line for occupancy each year, thus affecting the capacity of the institution to keep abreast of the increasing enrollments. However, the planning of an individual project, its subsequent funding, architectural preparation of working drawings, and eventual construction often take over five years.

Figure A contains a comparison of projected plant capacity and the instructional load measured in full-time equivalent students for the years 1965 to 1972 at the new University of California campus at Irvine. If enrollments increase as expected, it can be seen that there will not be sufficient capacity at Irvine until 1971. The increased increments of capacity represent more than one project coming on the line in some years. Shown below is a chart which indicates the problems of project timing and the application of space and utilization standards in the building program:

Phase	*Approx. time*
1. **Initial planning of building.** Faculty and campus planners prepare specifications based on instructional program and load expectations.	1–2 years
2. **Preliminary drawings, scoping and funding.** Utilization and space standards are applied to the projected enrollments. Space to be required and costs are estimated and checked by Department of Finance for inclusion in the budget and subsequent funding.	1 year
3. **Working drawings.** Prepared by the architects within the scope established previously.	1 year
4. **Construction.**	1–2 years
5. **Equipment purchase and occupancy.**	----

These phases are overly simplified and the timing does not always work out as indicated here. For instance, a very large project takes longer to build and often the funding of the projects spans a three-year period: working drawings one year, construction the second, and equipment the third. Small projects can be funded and equipped in one year. However, the preparation of preliminary plans and their review by state agencies will normally require the better part of a year. This review by the Department of Finance involves the examination of the existing campuswide facilities on the basis of space standards and the application of this information against the need for additional facilities. Any change in the standards should be viewed with consideration of these many projects on the drawing boards as well as the existing facilities.

CAPITAL OUTLAY PROGRAMS IN THE JUNIOR COLLEGES

Capital outlay in the two four-year segments has been financed through state bond issues for the past 10 years. These bond issues have provided sufficient funds to allow continuous planning and programming with relatively few interruptions for this period of time. The junior colleges, however, have been financing their capital outlay largely through their own district taxes and local bond issues. The phases in the building programs described for the two four-year segments apply also to the junior colleges except the timing of the funding of the projects may be somewhat different. Once a bond issue is floated and the money made available there need not be any delay between the phases as often occurs in the four-year segments. The State Department of Education usually provides expert consultants during parts of the planning stages, but normally this does not cause delay. The argument has been made that, because of the sporadic funding of capital outlay in the junior colleges as opposed to the more assured availability of funds for the two four-year segments, there should be leeway and perhaps lower utilization standards applied to junior colleges. Building programs have, however, gone on with relatively few bond issues failing among the junior college districts. From the standpoint of efficient planning and proper use of facilities, there should be no difference in space and utilization standards among the segments except where the program itself might warrant it, and except for those very small junior colleges in isolated areas with little or no population growth. As the state increases its support for junior college capital costs, the competition for limited funds from the three public segments will become keener. It becomes essential then that whatever standards are developed are equitable for all three types of institutions.

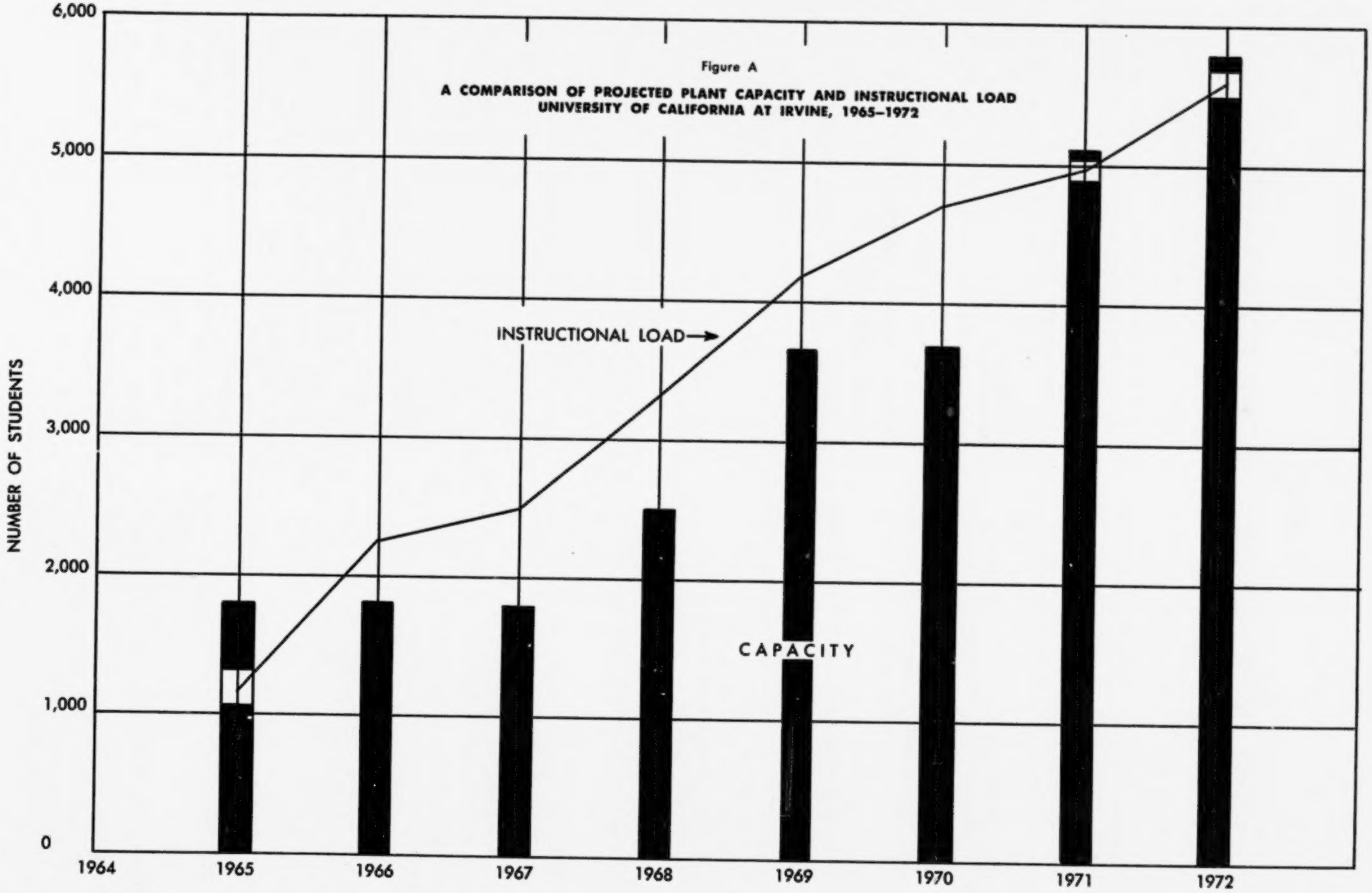


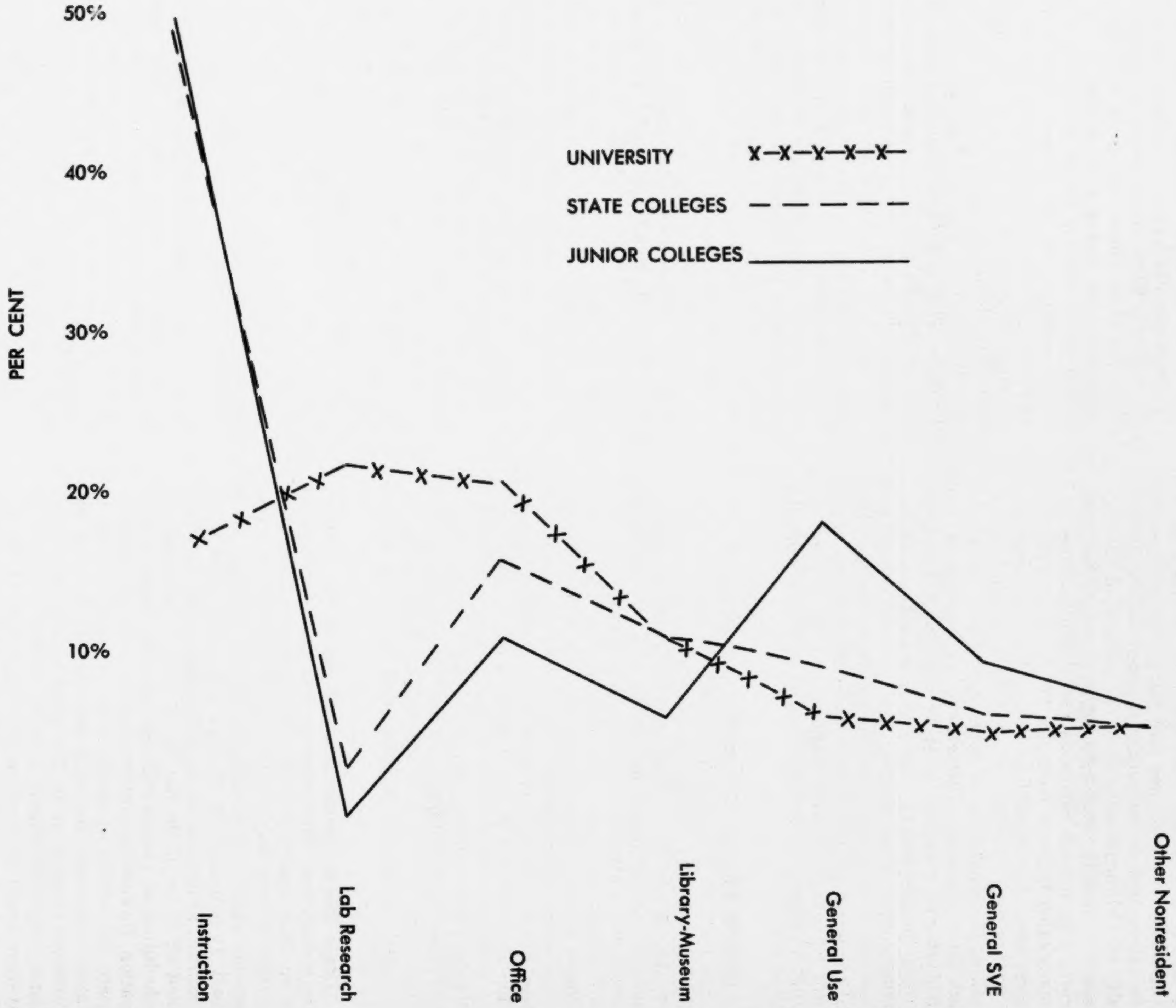
Figure A

A COMPARISON OF PROJECTED PLANT CAPACITY AND INSTRUCTIONAL LOAD
UNIVERSITY OF CALIFORNIA AT IRVINE, 1965–1972

SOURCE: University of California, 1966–71 Major Capital Improvement Program July 1, 1965. (Based on *Restudy* Standards.)

Figure B

DISTRIBUTIONS OF NONRESIDENTIAL PHYSICAL FACILITIES BY TYPE OF ROOM
CALIFORNIA PUBLIC INSTITUTIONS OF HIGHER EDUCATION



THE DEVELOPMENT OF UTILIZATION AND SPACE STANDARDS

About half of the total space on campuses of the California state colleges and the junior colleges can be categorized as instructional space. In the University of California only about 17 percent of the total space is used for instructional purposes. Other space categories include offices, libraries, auditoriums and many other types of facilities. The university employs more space for research purposes than for instruction (21.9 percent in 1963). Figure B contains a comparison of the breakdown of space by category of use for all three segments. Classrooms, seminar rooms and laboratories make up most of this space but other areas include service rooms for the classrooms and laboratories, music studios and practice rooms and specialized language laboratories. With the exception of the music areas the utilization and space standards will be concerned with instructional space which includes classrooms and laboratories and their appurtenant areas.

General Purpose Classrooms and Seminars. The peak loads on nearly every campus in the state occur during the day, rather than in the evening. Many of the metropolitan campuses have strong evening classes, but, by planning for the bulk of the enrollments which attend classes from 8 a.m. to 5 p.m., there will nearly always be space for all who wish to take classes at night. Since many of the campuses do not have heavy night classes, it has been the consensus of most persons connected with capital outlay planning that all standards be based on an 8 a.m. to 5 p.m. day or a 45-hour week. This is also in accordance with *Master Plan* recommendations which recognized that in projecting enrollments for new facilities the projections were to ". . . be limited to those to be instructed in the day program, that is from 8 a.m. to 5 p.m."[1]

Room Use in Terms of Hours per Week. One of the components which must go into the determination of the final space standard is the number of hours out of this 45-hour week which can be considered a reasonable figure for classrooms on the average to be used. It is unrealistic to hope a campus could be so planned, using computers, that classes could be scheduled all hours of the day in all rooms. Computerized scheduling of classes will undoubtedly improve utilization. However, computers may never be able to anticipate the whims of students in choosing courses in future semesters; nor will they be able to solve the problems brought on by the great variety of instructional programs. Figure 1 in the appendix shows the average hours per week in selected periods of the day classrooms are used for the three public segments. In all cases, rooms were scheduled for more hours in the morning than in the afternoon. There are probably two main reasons for heavier scheduling of classrooms in the morning and one of the reasons has more legitimacy than the other. Since laboratory classes traditionally have been scheduled most heavily in the afternoons, persons taking both laboratory classes and lecture classes would tend to be forced to take their lecture classes in the morning. Another reason is that the most popular hours for lectures are at 9 and 10 in the morning. Since there are more lectures class hours than lab class hours, the peak load for the entire campus occurs during these hours.

Another inhibiting factor in the complete scheduling of rooms up to the 45-hour week is the varying amounts of lecture hours for the many different course offerings. Figures 2, 3 and 4 in the appendix show that more classes are scheduled each day on Mondays and Wednesdays than on Tuesdays, Thursdays and Fridays. This is because Mondays and Wednesdays will accommodate both two- and three-credit courses (using Fridays for the three-credit courses) whereas Tuesdays and Thursdays can only accommodate the two-credit courses with the traditional hour-long lecture. One answer to this problem, of course, would be to move to more classes on Saturday. If this were accomplished, three-credit courses could be either offered on Mondays, Wednesdays and Fridays and/or on Tuesdays, Thursdays and Saturdays. While some courses are offered on Saturdays, utilization on that day is almost always lower than on the weekdays. The *Restudy* standards required classrooms and seminars to be used 36 hours per week.[2] However, those 36 hours were to be taken out of the total week and include the hours from 8 a.m. to 10 p.m. on weekdays plus Saturday mornings. This adds an additional 25 hours on the weekdays (plus four hours on Saturday) to the 45-hour week previously mentioned. On the average, rooms are not utilized to a great extent in the evenings in any of the segments. However, the junior colleges offered the greatest number of classes during these hours. Table I in the appendix contains a more detailed summary of the utilization of both classrooms and laboratories in all three segments. A comparison of how the classrooms were scheduled each week is presented below.

Average Hours Per Week

	8 a.m. to 5 p.m. (5 days)	*5 p.m. to 10 p.m. and Saturday*
Junior colleges	19.8	7.2
California state colleges	25.1	4.3
University of California	27.1	1.8

While the average for all junior colleges was lowest, several campuses showed rather high room use per 45-hour week: Diablo Valley, 32.5 hours; Merced with 32.6 hours; and Santa Barbara Junior College with 32.8 hours per week. San Francisco State College averaged 34.7 hours per week out of the 8–5, 45-hour week.

In developing the final space standards in this study, the room-use component of the formula was established at 34 hours per week out of the 45-hour, 8 a.m. to 5 p.m. week. This is very close to the component now used by the university in its capital outlay planning, since the *Restudy* standard of 36 hours per week allowed campuses to project students who will be attending classes from 8 a.m. to 10 p.m. Since the extra hours per week after 5 p.m. and on Saturdays averaged 1.8 hours, 34 hours (instead of 36) is offset by requiring projections to be reduced to those expected to attend classes during the day.

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[1] *Master Plan*, p. 7.

[2] Tables 33 and 34 of the *Restudy* Standards appear in the appendix as Tables VIII and IX.

Station Occupancy. The average number of times rooms are scheduled throughout the week only partially reflects utilization. The other utilization component is the degree to which rooms are filled to capacity when they are scheduled. If the rooms were scheduled 45 hours of the week and only half filled during this time, it is very likely that space has been wasted and a mistake made in the planning of the rooms twice the size needed. Obviously, classrooms cannot be filled to 100 percent capacity since students drop and add courses, courses change somewhat each semester, and it is impossible to predict class sizes in such a way as to allow them to fit perfectly into classrooms of equal sizes. Table 1 compares the average class size with the average classroom size in the three public segments. Since the classrooms were not categorized into upper and lower division levels, averages had to be computed on the basis of all levels. Table 1 class sizes, however, were categorized on the basis of level of instruction and are so indicated. Class size as a percent of the classroom size is slightly different if computed from Table 1 rather than Table I in the appendix, since the class sizes were selected from the entire 8 a.m. to 10 p.m. day in Table 1. The degree of "fullness" (or percent of station occupancy) when classrooms were in use averaged 72 percent at the state colleges, 57 percent at the university and 69 percent in the junior colleges. The percent computed for the state colleges and the junior colleges is somewhat inflated due to these two segments assigning more space per student station than the university.

TABLE 1

Comparison of Average Class Size and Average Classroom Size in General Purpose Classrooms and Seminars, Fall 1963 *

	Average class size	*Average classroom size*
Junior colleges	29	46
California state colleges		
Lower division	30	41
Upper division	23	
Graduate	14	
University of California		
Lower division	37	59
Upper division	26	
Graduate	13	

* The average classroom size represents the weighted mean room size in terms of the number of reported stations. Average class size as given here can only be taken as an approximation since the figure was derived from the mean class size for each campus with no weighting according to size of campus.

The Utilization of Laboratories. Since laboratories are usually designed for specialized instruction, they are much less versatile than classrooms and seminars in providing space for more than one subject field area. Consequently, utilization is lower. A comparison of how many hours the laboratories were scheduled each week is presented below:

Average Hours Per Week (Laboratories)

	8 a.m. to 5 p.m.	*5 p.m. to 10 p.m. and Saturdays*
Junior colleges	18.9	5.5
California state colleges		
Lower division	18.6	.9
All laboratories	15.4	1.2
University of California		
Lower division	19.4	2.4
All laboratories	16.5	1.8

Not only is there less versatility in laboratory facilities for providing space for more than one subject field area, but there also arises the scheduling problems resulting from the need to be concerned with blocks of instruction time which may range from two to five hours instead of the usual one-hour lecture period in the classrooms and seminars. Figure 5 in the appendix illustrates the patterns of scheduling laboratories throughout the day in the three segments. More laboratory classes are scheduled in the afternoons than the morning in the university and the state colleges (though there appears to be a close balance at the state colleges), but in the junior colleges the reverse is true. This is because a large proportion of the laboratories in the junior colleges are vocational in nature, requiring no lectures and are scheduled throughout the day with fewer conflicts on the part of a student's class schedule. Laboratory classes were scheduled more heavily on Tuesdays and Thursdays than on the other days of the week in all three segments. Figures 6, 7 and 8 in the appendix show the average number of hours on each day of the week laboratory classes are held. The fewest classes are held on Fridays, possibly because many laboratory courses, by tradition, have been organized so that a student attends two sessions a week—either on Mondays and Wednesdays or Tuesdays and Thursdays. Then, too, there is a tendency not to schedule classes on Friday afternoons.

All lower division laboratories averaged 19 scheduled hours per week. However, some junior colleges exceeded 25 hours per week—Fullerton averaged 26.9 hours; Glendale, 27.8; Lassen, 32; and Riverside, 26 hours. Lower division laboratories at San Francisco State College were utilized 25.8 hours per week on the average.

The *Restudy* standard for laboratory use at all levels of instruction per total week was 24 hours. Since there is a marked difference between the utilization rates at upper and graduate division as compared with the lower division, two levels of utilization are proposed instead of the one *Restudy* standard of 24. It is here proposed that the number of hours per week lower division laboratories should be used is 25, and for upper division, 20 hours. Station occupancy percents, usually higher in laboratories than in classrooms and seminars, were also adjusted for both upper and lower division. A comparison of selected standards in use in California has been placed in Table II of the appendix.

Station Occupancy. The percent of station occupancy when laboratories were in use varied in the

1963 study from 69 percent at the junior colleges, 79 percent in lower division laboratories (73 percent in lower and upper division laboratories averaged together) at the university and 85 percent each for both upper and lower division laboratories at the state colleges. Proposed station occupancy components in this study are: 85 percent for lower division laboratories and 80 percent for upper division. These percentages show a differential between upper and lower division utilization but do not differ appreciably from existing standards. (See Table II, appendix.)

THE PROPOSED UTILIZATION COMPONENTS

Rather than call the proposed utilization room-use and station occupancy figures individually as "standards," the term "component" is used since the standard finally recommended is derived from both utilization and space-per-station data and is expressed as "assignable square feet per weekly student contact hour" within the described category. After examining the utilization data from each campus in all three segments, and comparing these figures with existing standards, the following utilization components were developed:

	Hours week		*Station occupancy percentage*		*Station use*
Classrooms and seminars	34	×	0.66	=	22.4
Laboratories					
Lower division	25	×	0.85	=	21.3
Upper division	20	×	0.80	=	16.0

THE SPACE-PER-STATION COMPONENTS

The amount of space per station needed in classrooms and laboratories is a function of the type of room and its size. The larger the general purpose classroom the smaller the space per station requirements. Some laboratories require over 200 square feet per station while others need only 30. It was found that laboratories designed for similar subject field areas varied from 30 square feet in some institutions to over 150 in others. In order to arrive at the most reasonable space per station allowances to be used as components in the final space standards, the existing facilities in all segments were listed and then presented to the Committee on Facilities Standards for further analysis and comment.

Classrooms and Seminars. The space per station component commonly used in planning higher education facilities has traditionally been 15 square feet per station. This is more than what normally would be required for a classroom of 50 stations. According to the layout charts prepared by university planners (see Tables III and IV in the appendix) and used with slight modifications by a number of institutions in the Midwest and by the California state colleges, a classroom of 50 stations, using a conventional arrangement of tablet-arm chairs in solid rows, would require about 11.4 square feet per station. Pedestal-mount tablet-arm chairs with multiple aisles would require, for the same number of stations, 13.4 square feet per station. The distribution of classroom sizes according to the number of stations in the three segments has been presented in Figures 9, 10 and 11 in the appendix. The most popularly sized classrooms in the junior colleges ranged from 40 to 49 stations with the mean at 46. The mean in the state colleges was 41; the university, 59. While most classrooms at the university had between 40 and 49 stations, the greatest number of classrooms at the state colleges contained from 20 to 29 stations.

From these data, the recommended space-per-station component for classrooms and seminars is 15 assignable square feet per station including space in service areas (as defined in the appendix.)

Laboratories. It was the intention of the Committee on Facilities Standards and the council staff that the space per station recommendations growing out of the study would not merely reflect the average practice throughout the state, but would also consider the changing teaching techniques and adjust the recommendations accordingly. Table V in the appendix contains the ranges and the median per station sizes in the various types of laboratories throughout the state. Proposed space per station allocations are presented below in Table 2.

THE PROPOSED STANDARD: A FUNCTION OF THREE COMPONENTS

The three components making up the space standards—(1) hours per week rooms are expected to be used, (2) percent of station occupancy when rooms are occupied, and (3) the space per station for each subject field classification—interact with each other to give the allowable space per student. The equation for this interaction is as follows:

Assignable Square Feet per Station
Room Use × Station Occupancy = Assignable Square Feet per Weekly Student Contact Hour

Using this formula, Table 2 contains the standards space allocations per 100 weekly student contact hours for the various categories of space.

ADMINISTRATIVE PROBLEMS IN CAPITAL OUTLAY PROGRAMS

These space standards take into account the different patterns of curriculum emphasis among the various campuses since space allocations are made on the basis of numbers of students expected in each subject field area. There is not as much diversity in curriculum emphasis among the segments as might be expected. Table 3, below, shows the distribution of the proportional amounts of student credit hours among six broad subject field areas.

THE SMALL CAMPUS

Data from the 1965 council staff *Progress Report* showed that the small, isolated campuses required more space per student than the larger campuses in the metropolitan areas. Facilities must be provided for basic programs no matter how small the campus.

TABLE 2*

Assignable Square Feet per Station and per 100 Weekly Student Contact Hours, 8–5, California Public Segments of Higher Education

LABORATORIES

Subject field area	ASF/ stn.	ASF/100 WSCH[a] ASF/stn. ÷ Hrs. wk. × stn. occ. × 100
Life sciences		
Agriculture		
Lower division	60	280
Upper division	60	375
Biological sciences		
Lower division	55	260
Upper division	60	375
MPE sciences		
Physical sciences		
Lower division	60	280
Upper division	70	440
Mathematical sciences		
Lower division	30	140
Upper division	30	190
Engineering sciences		
Lower division	90	425
Upper division	110	690
Social sciences		
Psychology		
Lower division	40	190
Upper division	60	375
All other social sciences		
Lower division	30	140
Upper division	30	190
Humanities		
Art		
Lower division	65	305
Upper division	65	405
Other humanities		
Lower division	40	190
Upper division	40	250
Professions (U.C. & C.S.C.)		
Business administrations		
Lower division	30	140
Upper division	30	190
Education		
Lower division	--	---
Upper division	40	250
Home economics		
Lower division	60	280
Upper division	60	375
Journalism		
Lower division	60	280
Upper division	60	375
Health sciences		
Lower division	--	---
Upper division	50	315
Junior college classifications		
Agriculture	150	705
Business	30	140
Home economics	60	280
Applied graphic arts	80	375
Health services	50	235
Public personnel service	50	235
Aero. technology	175	820
Air conditioning	130	610
Building trades	175	820
Ceramic technology	40	190
Chem. technology	70	330
Drafting technology	60	280
Electrical technology	70	330
Electromechanical	100	470
Electronic technology	60	280
Engin. Gen.	90	425
Engineering technology	70	330
Industrial technology	75	350
Mechanical—Auto	200	940
Metallurgical technology	65	305
Metal trades	130	610
Textile technology	120	565
Welding	90	425
Other trade technology	75	352

Assignable Square Feet per Station and per 100 Weekly Student Contact Hours, 8–5, California Public Segments of Higher Education

CLASSROOMS AND SEMINARS

ASF/stn. = 15 sq. ft.
ASF/100 WSCH = 67 sq. ft.

Utilization components for space standards computation

	Hrs./wk.		Stn. occ. %		Stn. use
Classrooms and seminars	34	×	.66	=	22.4
Laboratories:					
Lower division	25	×	.85	=	21.3
Upper division	20	×	.80	=	16.0

Abbreviations

ASF/stn. = Assignable square feet per student station.
Hrs/wk. = Number of hours out of a 45-hour week, 8 a.m. to 5 p.m. a classroom, or laboratory, on the average, should be used.
Stn. occ. = The percent of expected student station occupancy when rooms are in use.
Stn. use = The number of hours per week (out of the 45-hour week) which a student station, on the average, should be used.
WSCH = Weekly student contact hour.

Formula for deriving the standards

$$\frac{\text{ASF/stn.}}{\text{Hrs./wk.} \times \text{stn. occ.}} \times 100 = \text{ASF/100 WSCH}$$

Example A. For determining ASF/WSCH in classrooms and seminars.

ASF/stn. = 15
Hrs./wk. = 34
Stn./occ. = .66

$$\frac{15}{34 \times .66} \times 100 = 67 \text{ ASF/100 WSCH}$$

Example B. For determining ASF/WSCH in lower division biological science laboratory.

ASF/stn. = 55
Hrs./wk. = 25
Stn./occ. = .85

$$\frac{55}{25 \times .85} \times 100 = 260 \text{ ASF/100 WSCH}$$

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* NOTE: This table supersedes Table 2 found in CCHE document 66-11 dated May 24, 1966.

While the space per student station can remain the same for both small and large institutions, utilization at the smaller ones is necessarily lower. Junior colleges of less than 1,000 students averaged over 25 percent poorer utilization than campuses with over 1,000 students. A 15–25 percent differential for each of the categories in the space standards for laboratories appears to be reasonable. Small, isolated junior college campuses are defined for purposes of this study as campuses in existence as of May 1966 for a period of at least five years and which have not attained an enrollment of 1,000 full-time students on an 8 a.m. to 5 p.m. basis. Figures 12, 13 and 14 in the appendix show the distribution of all campuses in the public segments according to size of campus in 1963.

TABLE 3

Distribution by Percent of Student Credit Hours in Six Subject Field Areas, by Segment, Fall 1963

	Life sciences	*MPE sciences*	*Social sciences*	*Humanities*	*Professions*	*Junior college class*
Junior colleges	4.3%	16.3%	23.1%	26.8%		29.5%
California state colleges	7.7	17.1	26.0	24.9	24.3%	
University of California	7.7	22.2	25.1	31.8	13.1	

Source: CCHE, *California Public Higher Education, Cost and Statistical Analysis,* June 1965.
Note: Subject field areas do not include physical education.

FITTING THE CAPITAL OUTLAY PROGRAM IN PROJECTIONS

The standards which have been proposed in this study are in terms of a space allowance per weekly student contact hour. One full-time student may have about 20 student contact hours per week. Ratios change from campus to campus and from year to year. Some campuses require more contact hours per credit in the same course taught at other campuses within the same segment. Since capital outlay must be planned on the basis of space required when students are actually occupying student stations, the weekly student contact hour is the basic student unit to be used. However, when enrollment projections are developed, they begin with such data as expected first-time freshmen, transfer students, continuing students, and other similar categories. It is important that in converting the projections of full-time students to student credit hours, full-time equivalent students, or weekly student contact hours care is taken to ensure that the conversion is made on the most recent ratios. The *Restudy* standards were published in terms of square feet per FTE student, based on the ratio in 1953 between the weekly student contact hour and the student credit hour. These ratios have been used ever since, with slight modifications. For instance, less laboratory time is required in engineering courses today than during the time of the *Restudy*. Using today's ratios in engineering in the application of the *Restudy* standards would have the effect of requiring less space per FTE student in engineering than that proposed in the *Restudy*.

Another problem relating to the making of projections lies in the need to determine the proportion of the total enrollments to be expected in each of the broad subject field areas. The tendency is to predict a larger proportion of students in a particular subject field area where an expected building program is to occur. For this reason, it is important to review the total student capacity of a campus each year, making certain that new projects coming on the line will not increase the total capacity of the campus beyond the expectations for total enrollments that year.

In all cases, enrollments should be projected on the expected number of students from 8 a.m. to 5 p.m. for reasons given earlier in this report.

Activity Rooms. The California state colleges have traditionally classified one type of classroom as an ''activity room'': a room too specialized to be called a lecture-type room, yet more versatile than most laboratories. Classes taught in these activity rooms have been the type requiring two contact hours per credit instead of the three usually required for laboratory courses and one for lecture-type courses. Utilization standards developed by the state colleges and the State Department of Finance have fallen between those of lecture rooms and the lower utilization standards for laboratories. Oftentimes, activity-type classrooms, though classified as such, are not used for activity classes but are used primarily for lecture-type classes. The result is that the capacity for campuses where this practice is common, is understated. It is proposed that the classification ''activity room'' be eliminated and that all rooms be classified according to the definitions shown in the appendix. However, in the reclassification of these rooms, most of them should probably be classified as lecture rooms, not laboratories. A guide to follow here should be that when the new inventory is taken and rooms are reclassified, the total capacity of the campus should not be reduced for reasons of the conversion of the activity rooms to either laboratories or classrooms.

THE IMPACT OF THE PROPOSED STANDARDS ON PRESENT CAPITAL OUTLAY PROGRAMS

The proposed standards developed in this study are estimated to be slightly higher than existing standards now being used by the university and the state colleges. However, they should reflect capital needs more accurately than previously used standards because they allow for the differential expected between upper and lower division instruction. As the student mix changes during the coming years. the capacity of the plant will need to be reevaluated. Projects now on the drawing boards need not be changed as a result of the acceptance of these standards. However, inventories of existing and funded facilities should be examined on the basis of these standards for future planning purposes. For this reason, it is important that inventories be taken and updated each year.

SECTION III

OFFICE SPACE STANDARDS

A significant portion of physical facilities devoted to higher education consist of office space for faculty and instructional departments. Development of office space standards is therefore essential.

As a part of its study of additional physical plant needs in education in California, and particularly in connection with the problem of calculating the existing capacity of physical plants, the *Restudy* recommended standards for assignable square feet per station for academic offices and standards for departmental office space.[1] The *Master Plan* recommendations concerned with utilization and physical plant capacity recommended these space standards, by reference "with some modifications as changes in the differentiation of function among the public segments may justify."[2]

Office space, as a percent of college total space by segment in 1963, was reported in the *Inventory of Non-Residential Physical Facilities* was as follows[3]: University of California, 20.7 percent, California state colleges, 16 percent, and California junior colleges, 11 percent. This appears to be a reasonable reflection of the differentiation of function among the segments set forth in the *Master Plan,* particularly in that it reflects the variation by segment in the faculty members' time which is devoted to academic responsibilities other than classroom teaching.

CALIFORNIA STATE COLLEGES AND THE UNIVERSITY OF CALIFORNIA

The California State Colleges and the University of California continue to use the space per station guidelines for planning academic offices and other departmental office space that were embodied in the *Restudy* and *Master Plan* recommendations in their physical plant planning.[4] The analysis of the 1963 inventory indicates that on an "assignable square foot per station" basis when calculated for *all facilities* (both permanent and temporary), both the state colleges and the university are well within the guidelines:

	Planning ASF/station academic offices	*Actual fall 1963 ASF/station academic offices*
California state colleges	110	96.8
University of California	130	102.0

PUBLIC JUNIOR COLLEGES

Specific recommendations on a space standard for planning academic offices in junior colleges were not included in either the *Restudy* or the *Master Plan.* As a planning guideline 80 assignable square feet per single man office has been followed by the junior colleges. Analysis of the 1963 inventory for *permanent facilities* of junior colleges indicates that the existing practice had provided an average of 80.4 feet per station in academic offices. (See Table 4).

There has not, however, been a standard for projecting the need for office space in junior colleges

TABLE 4

ANALYSIS OF OFFICE SPACE IN PERMANENT FACILITIES
By Station, FTE Teaching Staff and FTE Instructional Staff
California Public Junior Colleges—Fall 1963

Type of room	Assignable square feet	Number of stations	ASF per stations	FTE teaching staff	ASF per FTE teaching staff	FTE instructional staff	ASF per FTE instructional staff
All office space (300)[1]	1,135,950	----	----	----	----	8,040.0	141.3
Academic office (301)	420,016	5,225	80.4	6,766.7	61.7	----	----
Academic office plus other office (301 and 302)	844,603	8,609	98.1	----	----	8,040.0	105.0
Average of 46 "larger" Junior Colleges							
All office space	1,053,562	11,482	91.8	----	----	7,520.5	140.1
Academic office	394,419	4,900	80.5	6,325.5	62.4	----	----
Academic office and other office	787,179	8,034	98.0	----	----	7,520.5	104.7
Average of 14 "smaller" Junior Colleges[2]							
All office space	82,388	932	88.4	----	----	519.5	158.6
Academic office	25,597	325	78.8	441.2	58.0	----	----
Academic office and other office	57,424	575	99.9	----	----	519.5	110.5

[1] The computer code number for identification of room types. All office space includes conference rooms (304) and office service space (303) in addition to academic office and other office space.
[2] Defined as those colleges with fewer than 1,000 students and which had been established for more than five years.
Sources: Inventory of Non-Residential Physical Facilities by Type of Room, California Junior Colleges, fall 1963. California Public Higher Education Cost and Statistical Analysis, CCHE, June 1965.

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[1] Table 34, *Restudy of the Needs of California Higher Education,* p. 348. (See appendix, Table IX.)

[2] *Master Plan for Higher Education in California, 1960–1975,* pp. 96–97.

[3] *Progress Report, op. cit.*

[4] See Appendix B.

comparable to the "percentage of the total instructional staff space" recommended in the *Restudy* and *Master Plan* and used for planning purposes in the state colleges and in the University of California.[1]

In making the analysis, consideration was given to proposing a standard for evaluating total office space need based on FTE students. This was discarded as being inappropriate because of the differences in the student/faculty ratio which results from the variation in enrollment above or below the budgeted enrollment estimates from year to year.

An analysis of the 1963 inventory together with data now available from the *California Public Higher Education Cost and Statistical Analysis* for 1963, is presented in Table 4 for the junior colleges and in Tables VI and VII in the appendix for the public four-year segments.

The responsibilities of the junior colleges under the *Master Plan* would indicate a simpler standard for projecting required office space than would be the case in the public four-year segments. One which would appear reasonable would be a standard of assignable square feet for all office space per instructional FTE. ("all office space" here includes academic office [other office including administrative office], office service and conference rooms.[2])

The data on the junior colleges provide a reasonable basis for a standard for the planning of collegewide need for office space. It shows that the then existing permanent facilities provided 141.3 assignable square feet per instructional FTE. The lower portion of Table 4 shows the expected differential in present practice for "smaller" colleges. They are obliged to establish their general administrative and student service office at the outset, but can add students, faculty, and the academic offices for them without adding significantly to the number of larger administrative offices, thus lowering the average as the college grows.

	All permanent facilities, fall 1963	*Average of 46 "larger" junior colleges*	*Average of 14 "smaller" junior colleges*
Assignable square feet per instructional FTE	141.3	140.1	158.6

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[1] Table 34, *Restudy*. See Appendix B.

[2] See appendix for definitions.

Based on these findings, it is proposed as a reasonable standard for long-range planning for California public junior colleges that 140 ASF per instructional FTE be the standard for determining *overall office space* (as defined in the appendix) on a collegewide basis with an adjustment of 20 ASF for "smaller" junior colleges: allowing 160 ASF per instructional FTE for a junior college until it reaches the 1,000 student (on an 8 a.m. to 5 p.m. basis) level. This differential is necessary for there are junior colleges in outlying areas which have not attained the 1,000 student level even after having been in existence for five years. Such institutions will likely continue to exist, and their growth will be limited in the future.

PROPOSED OFFICE STANDARDS AND GUIDELINES

In light of the above, the following is proposed:

1. That the California State Colleges and the University of California continue to use the presently existing space standards for office planning and the guidelines for office sizes.
2. That standards for college planning of office space and guidelines for internal planning of office space within each college, should be established for the California public junior colleges as follows:

	All junior colleges ASF/instructional FTE	*"Smaller" junior colleges[a] ASF/instructional FTE*
Standard		
For office space planning, collegewide basis	140	160
Guideline		
Academic office: ASF/station	80	80
Guideline		
Academic office plus other office: ASF/instructional FTE	105	110
Guideline		
Academic office: ASF/teaching FTE	63	58

[a] "Smaller" for this purpose is defined as fewer than 1,000 students, and in existence for five years as of May 1966.

SECTION IV

SPACE AND UTILIZATION STANDARDS FOR LIBRARY FACILITIES

INTRODUCTION

Standard unit measures used in the planning of future (and evaluation of existing) library structures in the three public segments of California higher education currently are derived from several sources. The standards vary as to activities specifically included; these variations are examined below along with reports of actual inventories in an attempt to reveal points where possible deficiencies and/or inconsistencies may currently exist.

This section is divided into four parts: the first, a review of library floor space inventories in California public institutions of higher education for fall 1963 and fall 1965; the second, a comparison of California facilities with those of institutions in other states; third, an examination of planning standards currently in use and comparison with actual practice; and fourth, development of library space planning standards for public junior colleges in California.

EXISTING LIBRARY PROVISIONS

Data for library floor areas in the three segments are examined (see Tables 5, 6, and 7) below. Existing provisions of physical plant seem best described by examination of the central tendencies of several measures which generally relate function to allocated space. Inventories of physical plant for two recent points in time, fall 1963 and fall 1965, are developed separately to determine any significant trends in provision of library facilities in recent years and reveal, to the extent possible, inconsistencies in data which might exist in one year or the other.

With a few exceptions[1] the data are generally consistent for both years. Floor areas for both years were measured under the definitions contained in instructions for the Coordinating Council Cost and Statistical Analysis of fall 1963 data (see Appendix B for discussion of these definitions). In relating the major inputs housed (enrollment, collections, and staff) to floor area, measures of inputs which corresponded to inventory reported at the same point in time were used with two exceptions: for the university and junior colleges, statements of volume holdings for the 1965–66 academic year were not available at the time this report was developed. In these situations, it was necessary to utilize collection counts as of June 30, 1965. The resulting assignable square feet (ASF) per volume figures are most likely higher than would have been the case had the more appropriate volume counts been available. In addition, no reading station counts were available for fall 1963 in the state colleges.

Both mean and median figures are presented for each measure to provide a general picture of the variation present in each sample. As evident in both Tables 6 and 7, the large libraries at Berkeley and Los Angeles could have a major influence on the average of any particular university measure if their space provisions differed significantly from those at the smaller general campuses. Examination of Table 5, however, indicates that such influences did not seriously skew the university sample. Similarly, the several sets of data for the other segments are not unusually skewed either to the right or left, although large coefficients of variation (relative standard deviation) in certain cases (one example being 1965 floor area per staff position in the junior colleges) indicate that cautious use of several of the aggregate results is in order. Much of the variation is caused by individual differences in "lead" time (excess capacity built into individual facility to accommodate occupants several years beyond date of original occupancy) brought about by the practical exigencies inherent in campus planning and development. Hopefully, these differences may tend to balance out in each system.

The distribution of space noted in Tables 6 and 7 indicates that the junior colleges being dominated by the open stack configuration place greatest relative emphasis upon reading station areas with smaller stack areas (due to the relatively low ratio of volume holdings to enrollment). In the state colleges, there is a relatively greater requirement for stack capacity with primary emphasis also upon open stack areas. The average state college library contains more space for library services than either of the other segments. About 20 percent of total area was reported for this category in both years. Part of the reason for this difference may be due to variation in methods of measurement. The typical university library space allocation appears consistent in both years with more than 60 percent of total area absorbed in housing collections.

In actual practice, stack areas appear to be providing generally less than 0.1 square foot per volume in all three segments (see Table 5). It is probable that most of the unbound collection is contained within this "stack" area although a portion may (under the space measurement definitions) be contained on wall shelving in reading areas.

A marked variation in the number of students provided seating in the library exists in each of the three systems. The junior college library provided, on the average, stations for 11 percent of full-time enrollment in the fall of 1965. The reported 1963 inventory indicated a larger proportion of students being handled. The comparable measure in the other segments falls around 20 percent. In each case, the smaller,

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[1] The most notable of these is an apparently more restricted measurement of "museum" areas in 1965 as opposed to 1963.

TABLE 5

Functional Allocation of Library Physical Plant: California Public Higher Education—1963, 1965

	N	Stack—ASF per volume		Study stations per enrollment, percent		Study area—ASF per station		Library service—ASF per staff	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median
Junior colleges									
1963 [c]	70 [a]	0.10	0.09	14.1	13.6	26.9	na	166.4	na
1965	51	0.10	0.08	11.1	11.0	27.3	25.3	211.0	161.9
State colleges									
1963 [c]	13	0.150 [b]	0.142 [b]	na	na	na	na	220.3	232.1
1965	14	0.088	0.082	20	21	25.1	25.0	182.8	194.0
University									
1963	6	0.092	0.095	20	27	26.3	27.6	76.1	83.2
1965	8	0.083	0.090	18	21	27.5	28.7	90.9	88.5

Sources: CCHE California Public Higher Education Cost and Statistical Analysis, 1965; physical plant inventories reported by junior colleges, state colleges and university for fall 1965; California State Department of Finance, *Total and Full-Time Enrollment California Institutions of Higher Education, Fall 1965;* Governor's Budget, State of California, 1965–66, 1966–67; 1964–65 U.S. Office of Education library statistics compiled by School Library Research Project, California State Department of Education; *Library Statistics Universities and Colleges,* 1963–64, U.S. Office of Education, OE 15023-64, 1965.

[a] Not all junior colleges reported data for each category: for example, the figure of 26.0 ASF per station is based upon 67 colleges since 3 did not report station count.

[b] Includes indeterminate number of reading stations.

[c] Instances when data were unavailable are marked na.

TABLE 6

Allocation of Library Physical Plant and Average Full-Time Enrollment: California Public Higher Education; Fall 1963

	N	Stack	Open stack	Reading area	Library service	Museum	Fulltime enrollment
Junior colleges	70						
Percent of total ASF		12.4		53.1	11.5	5.3	
Mean college		1,414 asf	2,018 asf	6,070 asf	1,316 asf	609 asf	1,830
Median college		2,102	2,393	6,096	838	1,497	1,495
State colleges	13						
Percent of total ASF		10.7	28.5	38.2	20.3	2.2	
Mean college		6,914 asf	25,273 asf	24,615 asf	13,038 asf	1,427 asf	6,029
Median college		8,560	20,622	29,761	12,635	1,266	5,457
University	6						
Percent of total ASF		51.5	13.3	21.5	8.5	5.2	
Mean campus		83,660 asf	21,580 asf	34,859 asf	13,800 asf	8,461 asf	9,675
Median campus		17,716	17,700	13,588	10,295	4,339	5,264

Source: CCHE *California Public Higher Education Cost and Statistical Analysis, 1965;* Department of Finance *Report of Total and Full-Time Enrollment, fall 1963; California Institutions of Higher Education,* March 1964.

TABLE 7

Allocation of Library Physical Plant and Average Full-Time Enrollment: California Public Higher Education: Fall 1965

	N	Stack [a]	Study	Service	Museum	Fulltime enrollment
Junior colleges	51					
Percent of total ASF		34.8	51.6	13.3	0.3	
Mean college		4,645 asf	6,895 asf	1,779 asf	32 asf	2,836
Median college		3,301	6,595	1,149	0	2,621
State colleges	14					
Percent of total ASF		34.0	44.8	20.2	1.0	
Mean college		20,019 asf	26,335 asf	11,861 asf	592 asf	5,965
Median college		17,152	22,514	10,891	0	5,936
University	8					
Percent of total ASF		65.5	22.5	11.6	0.4	
Mean campus		84,383 asf	28,958 asf	14,999 asf	548 asf	9,005
Median campus		47,068	13,811	12,297	0	5,416

Source: Physical plant inventories for fall 1965 reported by the junior colleges, state colleges, and university; Department of Finance, *Total and Full-Time Enrollment California Institutions of Higher Education, fall 1965;* Governor's Budget, State of California, 1966–67; U.S. Office of Education 1964–65 Library statistics compiled by School Library Research Project, California State Department of Education.

[a] Includes reports for both "stack" and "open stack" areas.

newer campuses recorded the highest provisions (i.e., exhibited the longest net "lead" times) while the larger, more established campuses often failed to attain the 20 percent average. Again, individual campus or college situations at a point in time are often deceiving since a new library building or addition may have been recently occupied or scheduled for occupancy shortly after the inventory report.

Unit areas for reading stations, as one might expect, exhibit a lesser degree of variation than most of the other unit measures. The data reported for 1965 provided the opportunity to measure the floor requirements of more than 26,000 separate stations in the three systems. The results indicate an average allocation of slightly more than 25 square feet per reading station in the university and junior colleges while the state colleges reported 25 sq. ft.

The largest variation between the systems (and between the individual items in each sample) exists in the relationship of library service (work) areas to library staff positions. The junior college sample was skewed markedly upward by the presence of a number of large colleges each having a very high unit area of "library service" per staff position. Even so, however, most of the colleges in the sample were distributed in the range of from 150 square feet per staff to 200 square feet per staff. The state college median and mean averages both fell within this same range for 1965. The university, however, reported a tendency toward less than 100 square feet per staff for the same year. The difference between the junior college space allocations and that of the university might be explained on the basis of economies of scale, i.e., the larger library requiring a lesser unit work area than the smaller, since the average library service area in the university measured more than 10 times that of the service area at the typical junior college. Other differences, as indicated above, may be partially, or primarily, due to differences in measurement technique.

COMPARISON WITH NON-CALIFORNIA INSTITUTIONS

Data relative to library physical plant nationwide developed by the United States Office of Education[1] permit comparison of California practices with those of institutions in other states for the year 1963–64. The value of the data lies primarily in the fact that they are presented in functional categories. As a result, the major measurable inputs to be housed in the facility: students, books, and library staff, may be related to the specific type(s) of floor space which they normally occupy. The data allows evaluation of the bases which are generally common to statements of library physical plant standards: percentage of student population to be provided library study stations at any given time, stack area required to handle a measured number of volumes, and space required for the library staff in administration, reference and circulation, and technical processing. The data, however, do not allow certain other comparisons such as provision for unbound material, area specifically devoted to exhibits and museums, and audiovisual functions which may be housed in conjunction with a library.

It is well to note here that all floor areas are expressed in terms of usable or assignable square feet (ASF), with the exception of "other areas" which, under the USOE definition, may include corridors, stairs, and portions of lounges all of which under usual California terminology are referred to as non-assignable. Limitations in the data should also be noted. Lack of comparability due to varying interpretations of area categories only generally defined on the questionnaire is a distinct possibility. In addition, questionnaire instructions indicated that estimates could be reported if actual measurements were not available. There is no indication of the frequency of estimates as opposed to actual measurements. Further, not all of the institutions in the survey reported physical plant data. No comparison of the university with comparable institutions is possible due to incomplete reporting for most of these campuses. Only those institutions with complete reporting were used in the comparison samples. Observations which follow are made with full cognizance of the above limitations.

Junior Colleges. Several states were chosen at random for use in comparison of facilities with those of California junior colleges. The sample of 78 colleges in Tables 8 and 9 contains all public junior colleges in each state that reported complete information in the USOE survey. The methods of capital outlay financing in these states vary from 100 percent local district support in Texas, Minnesota and Illinois to complete state support in Florida, Michigan and Washington; others employ state-local sharing.

Stack Area. No apparent conclusion seems possible due to (1) the probable existence of study carrels in area reported as "stack" which would distort unit

TABLE 8

Functional Allocation of Library Physical Plant: California Junior Colleges and Selected Comparison Junior Colleges: 1963–64

State	Number of colleges	"Stack" ASF per volume	"Reading" ASF per student	Reading[a] stations per student	ASF per library staff
Florida	19	0.114	4.09	0.164	185.6
Illinois	13	0.035	2.79	0.112	79.8
Michigan	9	0.093	2.07	0.083	220.9
Minnesota	4	0.050	3.78	0.151	122.8
Texas	23	0.110	4.88	0.195	140.0
Washington	10	0.124	3.02	0.121	139.0
Total out of state					
Mean college	78	0.096	3.55	0.142	151.0
Median college	78	0.088	3.86	0.154	128.2
Total California					
Mean college	50	0.130	2.64	0.105	170.2
Median college	50	0.097	3.45	0.138	157.1

Source: *Library Statistics of Colleges and Universities 1963–64* (U.S. Office of Education, OE 15023-64, 1965).

[a] This calculation assumes that the average study station in "seating" areas occupies 25 square feet, but does not take into consideration those stations which may be located in other areas.

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[1] *Library Statistics of Colleges and Universities*, 1963–64, U.S. Office of Education, OE 15023–64, 1965.

measures, and (2) the inclusion of unbound material in this provision. Generally, however, the practice seems to center around provision of 0.1 ASF per volume both in California and in nonstate junior colleges (see Table 8). If USOE definitions were strictly followed by those reporting, this unit area includes both shelving and *files*, the latter at least housing a portion of nonbound collections.

Seating Area. These figures are probably the least meaningful of those derived from the USOE study due to the aforementioned lack of reporting of carrels in "stack" areas. If one assumes, however, that the average station in "seating areas" (USOE terminology) will occupy about 25 square feet,[1] the non-California junior colleges provide stations on the average for more than 14 percent of their full-time enrollment (see Table 8). The 50 California colleges on the other hand, provided a mean of 10.5 percent (the median was slightly higher).

Staff Work Area. The non-California junior colleges in the sample appear to have provided a smaller area per full-time library staff member than was the case within California in 1963–64. The tendency of the former was to less than 150 square feet per staff member, the latter (California) to more than 150 square feet.

Other Areas. These areas are not subject to evaluation due to the nature of the USOE definitions. This space may be "assignable" or "nonassignable" (stairs, corridors, elevators) or may even be devoted to nonlibrary activities. California colleges generally allocated a relatively greater share of library facility (22.8 percent) to this category than did the comparison institutions (15.7 percent); see Table 9.

State Colleges. Two groups of institutions were chosen for comparison in the case of the state colleges. Group A is identical (with exception of schools which did not report) to a group of selected institutions used by the State College Committee on Library Development in their *First Report,* December 1964. Group B is comprised of those institutions used by the Coordinating Council for purposes of state college salary comparison in the *Annual Report on Faculty Salaries, Benefits and Recruitment,* January 1966. Seven institutions are common to both groups. As seen in Tables 10 and 11, however, the inclusion (or exclusion) of several items in such a sample has marked effect on the overall character of the sample.

Stack Area. The state colleges reported a greater stack area per unit of bound volume than did either of the two comparison groups. As in the case of the junior college comparisons, the tendency for all institutions is around 0.1 square foot per bound volume. The probable inclusion of reading stations and files, etc., for unbound materials in this report again prevents precise evaluation of the data, however. The relatively smaller allocation of facility to stack area in the California state colleges (25.8 percent as opposed to 39.7 percent and 40.8 percent for groups A and B, respectively) is due primarily to the relatively smaller size of the average state college examined together with the marked difference in provision of volumes per full-time enrollment shown in Table 9.

Seating or Reading Area. State college provisions for this type of area appear generally similar to those in the comparison institutions although the state college mean average seating per full-time enrollment is lower (20.9 percent compared with 22.2 percent and 23.8 percent) due to several of the larger colleges providing less than 20 percent seating. Only the small private institutions in the comparison samples provide more than the "one-third accommodation" recommended by the American Library Association.[2] One large public institution provided more than 25 percent seating; the other public institutions provided less. The only state colleges to exceed 30 percent were those with less than 3,500 full-time enrollment, each

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[1] This figure approximates existing practice (in California) as demonstrated in this report, and is mentioned frequently in the literature.

[2] "ALA Standards for College Libraries," *College and Research Libraries,* XX (July 1959), 274–80.

TABLE 9

Allocation of Library Physical Plant and Other Measures:
California and Selected Comparison
Junior Colleges; 1963–64

State	*N*	Stack (Percent)	Seating (Percent)	Staff and work (Percent)	Other	Average full-time enrollment	Volumes per enrollment
Florida	19	17.2	49.9	12.8	20.1		
Illinois	13	14.7	66.1	11.7	7.5		
Michigan	9	25.3	39.0	16.6	19.1		
Minnesota	4	24.9	60.7	10.7	3.7		
Texas	23	26	53.6	9.2	11.2		
Washington	10	22.3	49.0	9.6	19.1		
Total out of state (*N* = 78)							
Percentage		21.8%	51.1%	11.4%	15.7%		
Mean college		1,491 asf	3,496 asf	785 asf	1,084 asf	984	15.8
Median college		1,080 asf	2,428 asf	500 asf	840 asf	629	
Total California (*N* = 50)							
Percentage		21.2%	46.6%	9.4%	22.8%		
Mean college		3,227 asf	7,093 asf	1,430 asf	3,474 asf	2,692	9.2
Median college		2,336 asf	6,050 asf	1,225 asf	2,500 asf	1,753	

Source: *Library Statistics of Colleges and Universities, 1963–64* (U.S. Office of Education, OE 15023-64, 1965).

TABLE 10

Functional Allocation of Library Physical Plant: California State Colleges and Selected Comparison Institutions; 1963–64

	n	"Stack" ASF per volume	"Reading" ASF per student	Reading[a] stations per student (percent)	ASF per library staff
Group A	11				
Mean institution	------	0.091	5.54	22.2	145.0
Median institution	------	0.090	5.41	21.6	141.6
Group B	10				
Mean institution	------	0.111	5.96	23.8	114.6
Median institution	------	0.103	6.26	25.0	104.6
California state colleges	16				
Mean college	------	0.127	5.22	20.9	121.8
Median college	------	0.136	5.62	22.6	122.9

Source: *Library Statistics of Colleges and Universities 1963–64* (U.S. Office of Education, OE 15023-64, 1965).

[a] This calculation assumes that the average study station in "seating" areas occupies 25 square feet, but does not take into consideration those stations which may be located in other areas.

TABLE 11

Allocation of Library Physical Plant and Other Measures: California State Colleges and Selected Comparison Institutions; 1963–64

	Distribution by percentage					
	Stack	Seating	Staff	Other	FTE	Vol/ FTE
Group A *n* = 11						
% of total ASF	39.7	29.4	9.0	21.9		
Mean college	52,663	38,984	12,018	29,121	7,035	82.5
Median college	44,335	27,127	14,625	25,000	7,867	
Group B *n* = 10						
% of total ASF	40.8	33.6	8.2	17.4		
Mean college	54,830	45,127	10,949	25,898	7,576	65.3
Median college	41,679	33,343	6,436	18,956	7,906	
California State *n* = 16						
% of total ASF	25.8	36.9	11.9	25.4		
Mean college	18,667	26,716	8,615	18,340	5,115	28.6
Median college	18,669	25,515	8,900	14,921	4,799	

Source: *Library Statistics of Colleges and Universities, 1963–64* (U.S. Office of Education, OE 15023-64, 1965).

of which could be classed (using Metcalf's terminology [1]) as a "residential liberal arts college in a small town." There is again the problem of probable uncounted student seating in "stack areas." As a result, the data may represent minimum description of actual situations in all institutions concerned.

Staff Work Area. There appears to be no significant difference between the area per unit staff reported by the state colleges as opposed to that reported by the comparison institutions. The majority of institutions in all three samples reported between 100 square feet and 150 square feet per full-time staff member. There was no inverse (or other) relationship demonstrated between size of staff and unit provision of floor area. This result is not surprising, however, in view of the many other variables (such as actual existence of "lead" and "lag" time in individual facilities, possible inconsistency in reporting, use or lack of use of automated processes, etc.) which may influence these figures. The majority of schools reporting more than 150 square feet per staff also reported staffs of less than 50 full-time employees, however.

CURRENT PLANNING STANDARDS

A considerable body of literature has been published regarding the standards used in the planning of college and university library buildings. Many of the earlier statements, however, revolved around rather subjective bases aptly described by Lyle in 1961:

> College librarians have tried, but not with complete success, to establish formulas or criteria to serve as guideposts in planning the library building. They have established these criteria not, as some have wished on the basis of sound scientific testing, but instead have been willing to work on a lower, purely empirical plane. They have accepted the judgments of successful practitioners in the field.[2]

More recent efforts [3] toward stating library planning standards appear to be more objective although there is still less than universal acceptance (at least in California public higher education) of uniform quantitative physical plant standards where such uniformity may be appropriate.

In California, both the university and state college systems employ library planning standards that are uniform throughout the respective systems. Standards used in the planning of junior college libraries, on the other hand, may vary from college to college, although the consulting service currently provided to individual colleges by the State Department of Education does introduce an element of uniformity. The university bases its library planning upon standards set forth in the *Restudy of the Needs of Higher Education,* published in 1955. However, the university administration does not apparently believe that these standards currently provide sufficient facilities for certain activities.[4] Library standards now used by the state college system were established in 1959 by a committee composed of campus building program coordinators, representatives of the State Board of Education, and the State Department of Finance. These standards are based upon slightly different inputs than the *Restudy* with significantly different results (see Table 12). Below, there are presented more detailed descriptions of the various planning standards of each of the segments of California public higher education along with some of the more pertinent ad-

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[1] Keyes Metcalf, *Planning Academic and Research Library Buildings* (New York: McGraw-Hill Book Co., 1965), p. 391.

[2] Guy R. Lyle, *The Administration of the College Library* (New York: The H. W. Wilson Co., 1961), pp. 382–3.

[3] See, for example, Keyes Metcalf, *Planning Academic and Research Library Buildings* (New York: McGraw-Hill Book Co., 1965); Library Association, *College Libraries* (London: The Library Association, 1965); Library Buildings and Equipment Institute, *Planning Library Buildings for Service* (Chicago: American Library Association, 1964); and Charles L. Trinker, *Library-Centered Junior Colleges: Buildings and Plans* (Northport, Alabama: American Southern Pub. Co., 1966).

[4] Letter from President Kerr to Director Spalding, dated April 18, 1966.

TABLE 12

Existing Physical Plant Standard for Libraries California Public Higher Education

	Stack area ASF per volume		Reading ASF per full-time student	Staff and work area ASF per staff	
	Bound	Unbound		Reference and circulation	Technical processing
University [a]	0.05–0.10	-- [b]	6.25 [c]	140 [c]	-- [d]
Berkeley, Los Angeles	0.06 [e]				
Other six general campuses	0.094 [e]				
State colleges	0.10	0.025	6.25	100 plus unspecified base area	100 plus unspecified base area
Junior colleges [f]	--	--	--	--	--

[a] University employs *Restudy* standards for libraries; see *Restudy of the Needs of California in Higher Education* (State Department of Education, 1955), p. 360.

[b] No specific provision.

[c] The *Restudy* provided "30 square feet per station and one station for every four full-time students." Assuming each reading station requires 25 square feet, and taking the student: reference staff ratio (1:112) at the university during 1965–66, then each reference-circulation staff member would be allowed 140 square feet.

[d] Included within provision for bound volumes; see Table 6 for staff area allocations at alternative volume area requirements.

[e] Restudy sliding scale produces varying unit area depending upon size of collection; these figures based upon 1965 university volume holdings.

[f] No uniform systemwide standards are currently employed by junior colleges in planning libraries.

ministrative planning policies which contribute to the eventual amounts of library physical plant provided. Analysis of the extent to which existing inventories correspond to the planning standards is also offered.

Junior Colleges. As mentioned, while there are no uniform standards employed throughout the junior college system, consulting services provided by the Bureau of Junior College Administration and Finance in the State Department of Education to individual colleges in the planning of library facilities do influence such efforts toward uniform space provisions. Approval of an individual project proposal by this consultant service is required where state and/or federal moneys are to be used in the funding. Where projects are to be funded from local sources, consultant approval is normally sought but disapproval may be overruled by the local governing board.

At the request of the council staff, consultants in junior college facilities planning reviewed existing practices and discussed these practices with a group of junior college planners with the following general observations.[1]

Current emphasis in junior college libraries appears to be moving away from the more traditional space allocation of study, stack, and service area to a "instructional materials center" concept which encompasses not only the "traditional" areas but also such functions as listening rooms, radio and television, lecture and display areas, audiovisual centers, and automatic data processing. There seems to be general agreement that 25 square feet per station is sufficient for reading stations except where carrels with devices for automated instruction are provided, additional floorspace allowances are in order—perhaps an additional 25 percent. Seating for at least 15 percent of the day attendance should be provided although it is possible that 10 percent in the main library might suffice if additional seating were available in a student center or in adjacent study hall areas to provide for peak requirements. No specific criteria for volume storage or staff work areas were offered; nor were any possible unit area measures proposed for the "nontraditional" activities. Space requirements for audiovisual functions and other programmed learning activities, are, it would appear, very difficult to define.

Building standards for junior college libraries were proposed by the American Library Association (ALA) in 1960 and are often used as basis for planning of such facilities.[2] These standards are indefinite about the space requirement for the collection, reference and circulation activity, and exhibits. The following measures are explicitly set forth, however:

Reading stations:
for at least 25 percent of the full-time student body; 25 square feet per station is "acceptable."
Staff work areas:
at least 125 square feet per person.

Examination of the data in Table 5 indicates that the ALA standard for seating of 25 percent of full-time enrollment is not being achieved in California junior colleges; nor does it appear to be the practice in other states according to review of 1963–64 USOE data later in this report.

The provision of an average of approximately 160 square feet of library service area per staff member for both 1963 and 1965 would correspond generally with ALA measures of at least 125 square feet per staff member plus public service and nonstation technical processing areas. Specific references to the space requirement for the bound and unbound collection in various planning descriptions vary up to 0.1 square foot per volume and are often cited as a lesser amount.[3] The junior college practice for both 1963 and 1965 appears to have been very close to 0.1 square foot per volume.

California State Colleges. Physical plant standards for state college libraries shown below appear in the *State College Planning and Procedures Handbook for Campus Development*. All of the usual inputs, students (in this case, 8 a.m. to 5 p.m. full-time equivalent students), volumes, and staff, are included in the formula; and, in addition, there is added (1) space for unbound materials (specifically set at 25 percent of the bound volume allowance), (2) technical processes space, and (3) space for public service and bibliography. Unit space allowances for the latter two categories are unspecified. The basic differences between these standards and those used by the university and junior colleges are indicated in Table 12. The standards are:

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[1] Letter from Associate Superintendent Paul F. Lawrence to Director Spalding, dated April 18, 1966.

[2] See *College and Research Libraries*, May 1960, XI, pp. 200–206.

[3] See, for example Ralph Ellsworth, *Planning the College and University Library Building* (Boulder: University of Colorado, 1960); J. J. Gerould, *The College Library Building* (New York: Scribner, 1932); and ALA Building Committee, *Planning a Library Building* (Chicago: American Library Association, 1955).

State College Library Standards

Libraries are to be programmed to provide the following space:

Reading stations—stations for 25 percent of the 8–5 FTE. Reading stations include study stations, group study stations, individual study stations, typing room stations and similar sit-down space. Reader station space—allow 25 square feet for each reader station.

Stack space—0.1 square foot is provided for each volume. Volumes are provided according to the following formula: 40 books for each total FTE student. In addition, stack area equal to 25 percent of the space provided by the above formula is allowed for special collections, periodicals, etc.

Staff space—100 square feet for each full-time library staff position.

Technical processes space—as required according to acquisition rate, method of ordering, type of biliography and method of operation.

Other space (public service, bibliography, lobbies, displays, staff lockers, etc.)—as required based upon size of library, staff and method of operation.

The reading station allowances include the immediate area for the station and direct access. Not included in this particular provision are any public service circulation areas or indirect access, i.e., corridors, portions of lobbies, and areas near elevators required for the student to make his way from the entrance to the station. An actual unit area for fall 1965 at 25.1 square feet per station was reported for more than 5,000 individual stations at five different colleges. This is remarkably consistent with the state college standard and unit allowances often quoted in the literature. Based upon full-time enrollment (not greatly different quantitatively than 8–5 FTE) for fall 1965, only three colleges of the total 14 for which data were reported actually achieved the 25 percent seating goal. The three were small, none having as much as 3,000 total full-time enrollment. Five colleges of the 14 reporting achieved a 20 percent or greater level of seating accommodation.

The stack provision for 0.1 square foot per volume is equivalent to the *Restudy* allowance for the first 150,000 volumes of a collection. In practice, the colleges are apparently operating with a slightly smaller allowance for both bound and unbound collections during the 1965–66 academic year. The calculated allowance for unbound volumes would, depending upon the total area allowed to the library service functions, amount to around 5 percent of total library space as developed by the standards for 1965–66.

The staff work area of 100 square feet per position is an average and, in practice, some positions will require more, some less. Major areas not specifically containing work stations are apparently planned according to the particular program situation of the individual library.

The total library is normally planned to house the level of activity which is anticipated three years beyond the date of occupancy, i.e., a three-year "lead time." For fall 1965, however, only four colleges were operating with net areas beyond those immediately required (this situation is presented graphically in Figure C).[1] Only one of these schools contained more than 3,000 full-time enrollment. Four of the total 14 colleges reporting fall 1965 data indicated actual inventories of bound and unbound volume area which exceeded totals allowed by the planning standards.

If one were to apply the *Restudy* allowances to the state college library situation for 1965–66, the unit staff work area allocation for reference-circulation would amount to 375 square feet while the technical processing staff would be provided with 161 square feet each. These figures result from application of the standard 1965–66 student-reference staff ratio of 1:300, and the assumption that stack sections will occupy 8.3 square feet and house an average of 125 volumes each.[2] The stack allowance per volume which results (0.066 square foot) however, differs markedly from the standard of 0.125 ASF per volume for bound and unbound collections.

University of California. The *Restudy* standards currently employed by the university in library facility planning, summarized in Table 12, are stated as follows:

> 1. Reading rooms and study halls, including circulation desks and staff offices: 30 net square feet per station and one station for every four full-time students, or 7.5 net square feet per full-time student.
>
> 2. Collections housing the volumes listed below, including work areas, assuming progressively greater use of closed stacks as collections increase in size, and the use of central storage facilities for the larger collections:

	Net square feet per volume
First 150,000 volumes	0.10
Second 150,000 volumes	0.09
Next 300,000 volumes	0.08
Next 400,000 volumes	0.07
Second 1,000,000 volumes	0.05

Notably, the staff work areas are explicitly included within the allowances as stated. Unbound collections are evidently to be included within the allowances for bound volumes. University staff are currently conducting a comprehensive review of library planning in an effort at improvement and restatement of the basic space allowances.

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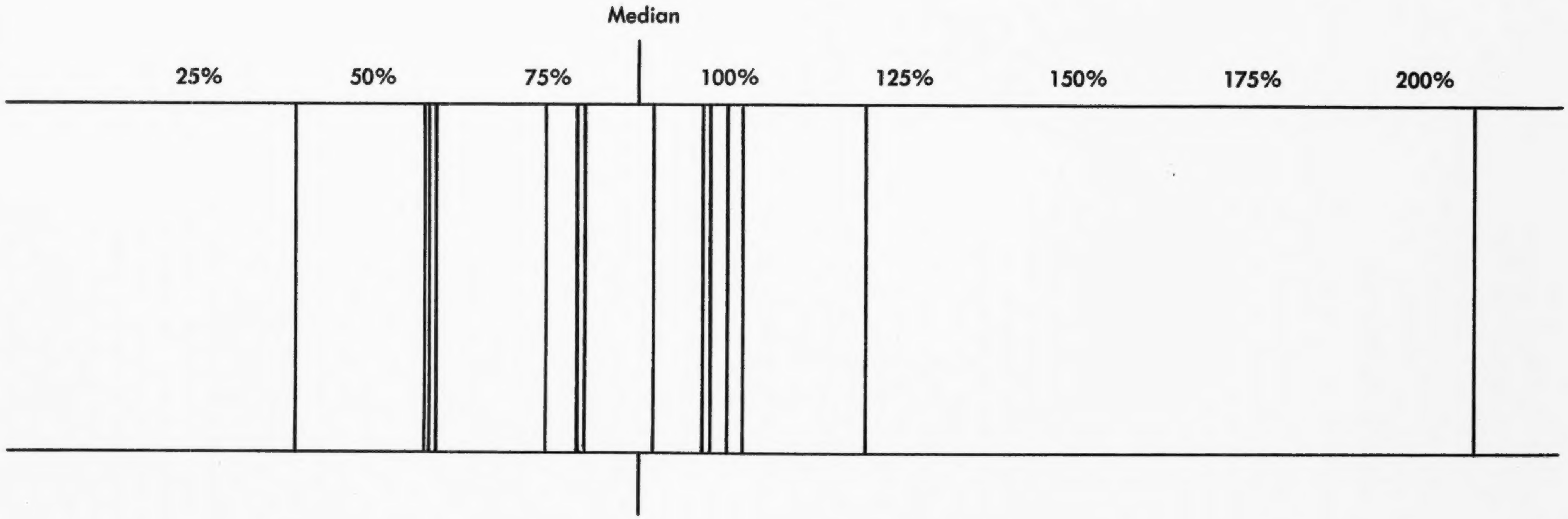
[1] The "needed" capacity was calculated based upon the conservative assumption that the unspecified service areas in the standards amount to approximately 50 percent of the unit work space allowance per staff.

[2] These figures are indicated by Metcalf to be adequate. See Metcalf, *op. cit.*, pp. 393–6.

Figure C

STATE COLLEGE LIBRARY FACILITIES: ACTUAL CAPACITY AS PERCENT OF CALCULATED CAPACITY, FALL 1965 *



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* Each vertical line represents the location of a state college on the scale. Assumed standards: state college library standards (unspecified technical processing, public service, and bibliography areas assumed to total 50 percent of staff space).

As indicated in Table 12, if the average reading station occupies 25 square feet, then the *Restudy* standards allow the university 140 square feet per reference-circulation staff position based upon the approximate university student-to-staff ratio in this area. The technical processing areas available under this formula depend upon the space requirements of the bound collection. In Table 13, alternative volume requirements are assumed with the resulting unit areas per technical processing staff indicated. In practice, it is doubtful that the figure of 160 volumes per single-faced section is very often achieved at the university. In addition, it is more likely that the unit of 7 ASF per single-faced section may be achieved in practice at Berkeley and Los Angeles than at the other six general campuses where the 8.3 ASF per section may even be a little conservative. As a result, the most probable result of the *Restudy* application is that Berkeley and Los Angeles demonstrate a calculated allowance of approximately 94 square feet per staff position in technical processing while the other six general campuses would be allocated a standard allowance of around 153 square feet for the same purpose. Again, it must be noted that through all these calculations there is no provision for unbound materials.

TABLE 13

Restudy Space Allowance Per Full-Time Technical Processing Position Under Alternative Stack Space Requirements—University of California [a]

	ASF per single-faced section	Volumes per section	
		160	125
Six general campuses	7	278.0 asf	211.3 asf
	8.3	233.6 asf	152.9 asf
Berkeley, Los Angeles	7	282.5 asf	94.2 asf
	8.3	156.9 asf	0

Sources: Governor's Budget, State of California, 1966–67; Keyes Metcalf, *Planning Academic and Research Library Buildings*, (McGraw-Hill Book Co., 1965); Report of Size of Libraries of the University of California (bound volumes and current serials), June 30, 1965.

[a] Based upon current collections; yearly processing of 1,000 volumes by each technical processing staff position (approximate 1964–65 budgeted level); and average assignable square feet per volume as allowed by *Restudy* sliding scale.

A two-year "lead" time is generally planned into university libraries except in certain cases where it may be possible to justify a larger building on the basis of interim occupancy by campus activities other than the library. The fall 1965 inventory indicates that four of the eight general campuses report actual floor area in excess of that which application of *Restudy* standards would justify, i.e., there is a net "lead time" at four campuses (see Figure D). It should be noted, however, that the volume inputs upon which these calculations are based represent holdings as of June 30, 1965. As a result, net additions to holdings between that date and the fall inventory as well as other volume additions during the 1965–66 academic year (when further additions to physical plant floor area are doubtful) are not reflected. Thus, the percentage capacity figures are higher than would be the case if more appropriate collection counts were applied.

DEVELOPMENT OF LIBRARY SPACE AND UTILIZATION STANDARDS FOR JUNIOR COLLEGES

As noted above, no uniform library physical plant planning standards have heretofore been established for the junior colleges. Due to the growing use of state and federal funds for supporting such facilities, uniform standards for this system seem no less appropriate than for the other two segments of California public higher education. In the following material, such standards are developed for the several functions currently performed by junior college libraries.[1] First, there is a detailed examination of each standard and the function which it is intended to serve. This is followed by a summary of the specified planning standards proposed and, finally, an examination of two of the many planning ramifications which may arise in the application of the proposed standards.

It should be established at the outset that the standards are intended primarily for the purpose of determining a total floorspace that is required to accommodate a given set of library functions. The standards are not necessarily intended to provide a basis for actually designing the library building interior. The standards do, however, closely approximate the actual need for a given activity, and, to that extent, they may be of assistance to those charged with the responsibility for determining the general interior configuration of a college library.

RELATIONSHIP OF STANDARDS AND LIBRARY FUNCTIONS

Library Functions. The space standards are intended to accommodate those library operations which have been traditionally provided on the college campus: (1) storage of bound and unbound materials used by students; (2) provision of reading areas for students wishing to use library materials which are close at hand; (3) the cataloging and other necessary processing of materials and the reference and bibliographical services demanded by students and (4) miscellaneous displays. As in the past, these functions are accommodated in the following space categories (in their respective order): (1) stack and open stack, (2) study hall and carrel, (3) library service, and (4) museum.[2]

In the modern college library there are also other kinds of activities which must be of direct concern to those planning facilities. For instance, there is a growing tendency, especially in the junior colleges, to

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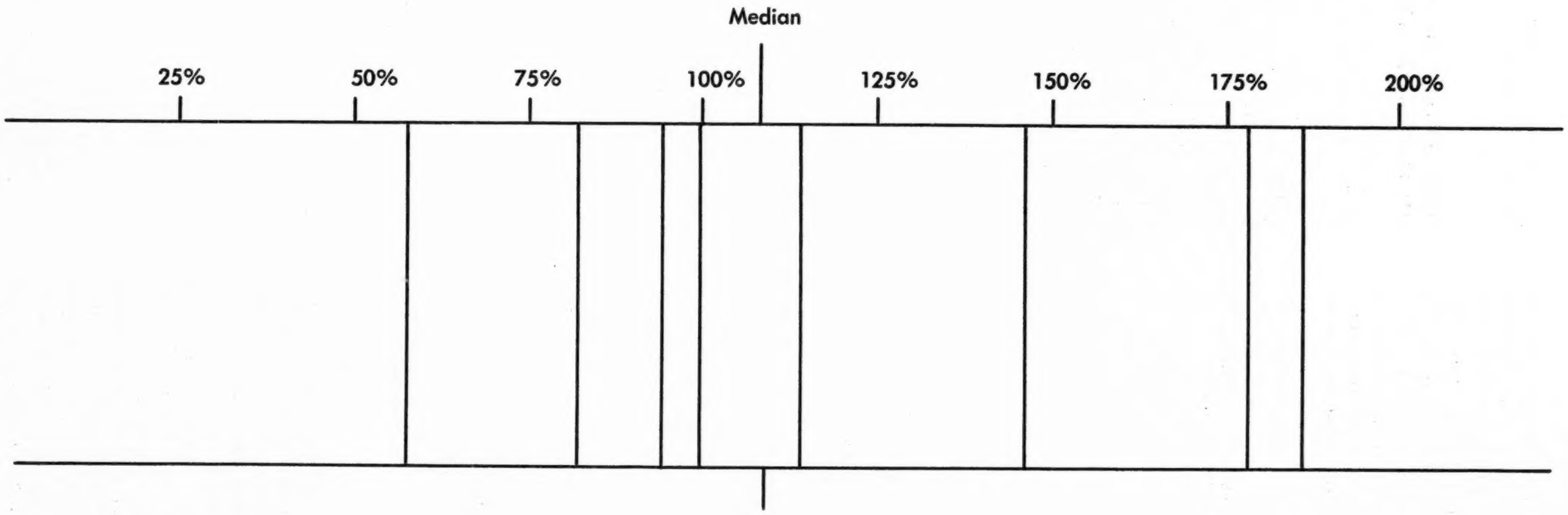
[1] Several committees composed of technical experts in the areas of library operation and facility utilization were consulted at various stages of this study. These committees were (1) the State Committee on Higher Education Library Resources Committee, (2) Facilities Standards Committee, and (3) the Standards Committee of the Junior College Roundtable of the California Library Association. State Department of Education staff who administer the program subvening funds for Junior College capital outlay were also consulted as was the chairman of the library subcommittee of the California Junior College Association.

[2] Definitions of the type of area included under each of these categories appear in Appendix B.

Figure D

UNIVERSITY LIBRARY FACILITIES: ACTUAL CAPACITY AS PERCENT OF CALCULATED CAPACITY, FALL 1965 *



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* Each vertical line represents the location of a campus on the scale. Assumed standards: *Restudy* space requirements.

house campus audiovisual services in the central library facility. Such installations may be of the more traditional variety which provide for the storage and circulation of projectors, films, and other equipment and materials or may include television, photography, graphics, and other activities as well. Due to the variation from college to college in the use of such media, there appears to be little value in attempting to establish a standard for the "usual" audiovisual facility. We would only suggest that where such facilities are included in the library building they should be provided accommodations which are based upon the objectives of service concerned. These accommodations must be calculated over and above the allowances provided by the standards pertaining to the "traditional" functions.

The programmed learning facility constitutes still another activity which commands increasingly larger portions of library area in newer facilities. These facilities are quite variable in size and function though usually designed around the concept of stations which are equipped for nearly instantaneous access to information that is centrally stored. Very often, in practice, these facilities are operated as a part of the overall audiovisual service. The programmed-learning arrangements are as yet of relatively undetermined potential in the instructional process but certain direct values to particular instructional departments may be readily identified, such as in the case of a listening-station facility for a language laboratory use. When the using instructional departments may be readily identified, prorated portions of the learning facility should be charged to these departments as part of instructional capacity allowances. As part of the audiovisual facility, the listening rooms, booths, or similarly equipped stations, should be provided as accommodations which are excluded from the "traditional space" allowances in the library. One listening-station or equipped carrel, for example, generally requires more floor space than the normal library reading station.

Housing the Collection (Stack and Open Stack). *Proposed standard: 0.10 assignable square foot (ASF)* [1] *per volume (of which approximately 75 percent would house bound items, with 25 percent for unbound items.)*

It is not particularly difficult to determine the floor space requirements for bound materials, given knowledge of the types of shelving currently available. Much of the college library collection, however, consists of unbound items such as periodicals, maps, newspapers, microfilm and other documents. The difficulty of establishing a standard unit for such material and then determining its floor space requirements is obvious. Most of the literature relating to library planning has advocated between 0.067 and 0.10 assignable square foot per *bound* volume. Little is said concerning the specific needs of unbound materials.

Recent practice in California public junior colleges has ranged on the average between 0.08 ASF (during 1963) and 0.10 ASF per volume (during 1965) for reported stack and open stack areas, although there was considerable variation from college to college.[2] The average storage practice for 78 non-California junior colleges in 1963–64 approximated 0.09 ASF per volume. (See Table 8.)

If one were to assume a facility configuration which is representative of the usual junior college library, i.e., one in which the majority of stack areas are of the open variety containing study stations either between or around the shelving:

(1) 125 volumes per single-faced section
(2) 9.0 ASF per single-faced section
(3) Range spacing of approximately 5 feet
(4) Center aisle of at least 5 feet
(5) Aisles of 3 feet between carrels and ranges, then the average stack area, with carrels adjoining, would require 0.072 ASF per volume.[3]

Short of attempting to compute the space requirements of representative units of unbound materials (a very difficult task at best), a sufficiently accurate approximation of need would appear to be one in which the above measure as determined for *bound* volumes (0.072 ASF) is expanded to conform to the best estimate of average actual practice in the junior colleges (0.10 ASF per bound volume) and, thereby, include a provision for unbound materials. The result is that unbound materials are allocated floor space at the rate of 0.028 ASF per bound volume, or occupy approximately one-fourth of the total stack area. This would appear to be sufficient provision for the typical junior college situation.

Area for Reading Stations (Study Hall and Carrel). *Proposed standard: 25 assignable square feet per station*

California public junior colleges have recently provided between 25 and 27 assignable square feet, on the average, per reading station in the library. The state colleges and university provide an average of 25 ASF with very little variation. Such statistics involving the utilization of space for stations appear to be more credible than other of the data regarding library use since the amount of space accommodating a study station does not appear to be a function of the "lead" or "lag" time inherent in facility provision. The average reading station area remains approximately unchanged in spite of possible over (or under) utilization of the library floor area.[1]

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[1] The assignable square feet include those areas which are "usable" for the functions described. Not included in this usable category would be such areas as the main lobby (excluding card catalog area), elevators, stairs, walled corridors, restrooms, and areas accommodating building maintenance services.

[2] The standard deviations of the 1963 and 1965 samples examined were quite large resulting in coefficients of variation both greater than 70 percent. This typifies the difficulty in evaluating data pertaining to the use of library facilities at any point in time. It is highly improbable that very many junior colleges would demonstrate (at any given point in time) what might be considered optimum utilization of the library facility. More typically, a college will have recently occupied the facility and report "excess" space (representing reasonable lead time in facility construction) or the college will be operating in a "deficiency" situation awaiting the planning and/or construction of additional facility. In either case, the data must be reviewed rather critically.

[3] By way of comparison, University of California staff recently proposed a set of library space standards which provided stack area for 125 volumes per section, with 8.7 ASF per section for a resulting 0.07 ASF per volume.

Measures of individual station requirements as contained in the literature generally cite 30 assignable square feet as being sufficient to accommodate the equipped carrel or large lounge chair. For most individual study carrels (without the "programmed learning" type of equipment) and tables seating four or fewer persons, 25 ASF of floor area appears sufficient. Finally, for large tables which seat more than four persons, 22.5 ASF per station is regarded as "adequate" seating.[2] Given a college library which contains approximately equivalent numbers of each of the above three station types, the average unit area of 25 ASF per station appears to be a reasonable guide.[3]

Number of Reading Stations. *Proposed standard: number of stations: 15–20 percent of estimated full-time enrollment* (students taking 12 or more units), scheduled according to the relative emphasis of college curriculum on "trade-technical" instruction:

Stations as percent of full-time enrollment [a]	*Percent of total student credit hours devoted to "trade-technical" courses* [b]
15%	11% and greater
16	9% and 10%
17	7 and 8
18	5 and 6
19	3 and 4
20	less than 3

[a] The measure of full-time enrollment is chosen as being the most relevant indication of reading station need. Full-time enrollment may also be converted to weekly student contact hours (WSCH) for purposes of comparing library capacity with instructional capacity (measured in WSCH).

[b] Courses such as building trades, engineering technology, textile technology, dry cleaning, etc., are within "trade technical."

For example, a college which devoted more than 11 percent of total student credit hours offered to "trade-technical" instruction would plan for a sufficient number of study stations to seat 15 percent of anticipated full-time enrollment.

The range of average practice in California public junior colleges during recent years has been to provide stations sufficient to seat between 11 and 15 percent of full-time enrollment at any one time. The university and state colleges have attempted to plan seating accommodations for 25 percent of full-time equivalent (FTE) students but the average campus or college in both segments has operated with an actual station count representing 20 percent of full-time equivalent student enrollment.

The literature generally cites a standard of 25 percent as being acceptable but there is considerable variation in the level recommended depending upon the character of the institution involved. Several variables which generally describe this institutional "character" appear intuitively to be significant in determining the proportion of stations. Those variables examined in this study are:

(1) Curriculum (relative emphasis by subject field area)
(2) Method of instruction
(3) Accommodations in buildings adjacent to library
(4) Provisions for student residence on campus
(5) Student mix (i.e., level of instruction offered)
(6) Location of campus
(7) Policy of library relative to nonstudent use
(8) Size of campus (student enrollment)

The general method used in examining these variables was to correlate (1) study stations as a percent of enrollment on (2) that measure which seemed to best typify the particular variable under consideration. The results of this effort are shown in Table 14.

While several of the variables were statistically significant as indicators of variation in reading station provision, the only reasonable indicator (among those examined) is the nature of curriculum as measured by the percentage of total student credit hours which are devoted to the "trade-technical" offerings. One would expect that as more of college student instruction is devoted to the trade-technical area, there would be less of a demand for study station facilities in the library due to the very nature of such instruction. The examination of data for fall 1963 indicated this to be true in actual practice. Conversely, library reading station needs would be expected to increase as the relative amount of instruction in social sciences and humanities increased. The data, however, did not reveal any such trend.[4] Therefore, the "trade-technical" expression was chosen as the standard indicator for determining the appropriate percentage within a 15- to 20-percent range.

TABLE 14

Correlation Coefficients of Reading Station Provision on Variables Describing Institutional Characteristics (1963 unless otherwise indicated)

Adjacent facilities	
(campus classroom stations per full-time enrollment, 1965)	.684 [c]
College size	
(full-time enrollment, 1965)	—.445 [c]
(full-time enrollment)	—.405 [c]
Curriculum	
(SCH [a] in "trade-technical" instruction as percent of total SCH)	—.247 [c]
Adjacent facilities	
(campus classroom stations per full-time enrollment)	—.195
Estimated population in college area [b]	—.153
Curriculum	
(SCH in "junior college classification" as percent of total SCH)	.075
(SCH in social sciences and humanities as percent of total SCH)	—.017

[a] SCH: student credit hours reported.

[b] Where only one college is located in a county, the county population was used. Where more than one college is located in a county, such as Los Angeles, estimates were made on the basis of assessed valuation.

[c] Statistically significant at the 5-percent level.

---

[1] This was confirmed in the statistical treatment of the data. The coefficient of variation for the measure "ASF per study station" was much smaller than that obtained for any of the other measures of space per input of library activity.

[2] See *Metcalf, op. cit.*

[3] Colleges whose instructional methods encourage more than the usual amount of individual study may wish to provide a greater number of individual study carrels than the station "mix" assumed above. The 25 ASF per station provision may be slightly deficient in such a situation. However, it may be possible to "makeup" this deficiency by over utilization of certain other areas.

[4] This may have been due to the presence of other variables which were not held constant or, once again, the disturbing statistical influence of existent lead and lag times.

The accommodations available for student study in other-than-library buildings on a college campus may be very important during certain peak study periods of the term (such as before finals, etc.). It may even be argued that the seating accommodations in the library should be based in part upon what other potential seating is available elsewhere on campus. However, an examination of library station provision relative to the number of potential study stations elsewhere on campus (as expressed by the number of classroom stations per full-time enrollment) was inconclusive for the fall 1963 situation and contradictory for the fall 1965 situation. This result is indicated in part, by the particular correlation coefficients shown in Table 14. In the fall of 1965, those colleges which had the largest library station provision relative to enrollment also had the largest number of classroom stations relative to enrollment. Therefore, while the concept of utilizing adjacent facilities seems quite reasonable, there is currently no empirical basis for constructing a junior college reading station standard to include this variable.

The facts that (1) with one or two exceptions, California public junior colleges are commuting institutions, and (2) they offer only lower division instruction, led to the use of a maximum library seating provision of 20 percent. As stated previously, both the university and state colleges currently plan for seating 25 percent of their enrollment. This provision accommodates all levels of instruction (including graduate) and occurs in situations of significant student residence on campus, both factors considered to be indicative of high library use. Only in the most rare circumstance would a junior college appear to have need for a library reading station provision of similar magnitude. On the other hand, those colleges that would find it appropriate to plan for seating less than 15 percent of the full-time enrollment would appear to be equally as rare.

College size was found to be a significant variable. Smaller colleges provided (both in 1963 and 1965) a greater percentage library seating provision than did the larger colleges. This result, however, is probably due to the fact that smaller colleges generally possess a greater "lead-time excess" in their facility than do the larger colleges where enrollments may have caught up with library facilities which were occupied during the initial years of operation and not subsequently augmented. Even if this practice exists there does not appear to be any particular rationale for providing differentials in percentage of library seating accommodations merely on the basis of campus size.

No feasible way of examining individual college policies regarding nonstudent use was determined even though this may be a significant factor in some cases. The same was true of the method of instruction variable. While library station use may increase as more emphasis is placed upon individual study, there was no feasible quantitative way of measuring this influence.

Examination of the location variable was also fruitless. It is generally thought that rural college libraries receive relatively more use than do college libraries in urban areas. The correlation of adjacent population on college seating provision was not significant, however. In any event, this variable would be rather impractical in actual use since no accurate library data relating population to junior college districts exists.

A comparison of the proposed reading station standard with actual reading station provisions in the junior colleges during fall 1963 appears in Figure E.

Student Measure. The student measure of full-time enrollment (students taking 12 or more units) appears to be the most reliable indicator of reading station needs on the average college campus. Clearly, measures of class attendance (the basis for junior college financial assistance) have little relationship to the library station use. The contact hour of enrollment (weekly student contact hour) seems to add little as a relevant measure since it would appear to understate the need of the college which offers relatively more instruction in the social sciences and humanities and would thus generate relatively fewer contact hours per potential library user than would the institution which offered relatively more instruction in the areas which demand more class contact hours per potential library user.

The "full-time equivalent" based upon 15 average credit units per term could be used as an indicator although many of the student credit hours reported may arise from part-time students who take only one or two courses while working part- or full-time and are not able to spend time in the library that is even proportional to the number of credit hours undertaken. The full-time student taking 12 or more units would, in the final analysis, appear to be the most desirable indicator.

A further question relates to the time of day of instruction. Space and utilization standards for instructional facilities are scheduled on an 8 a.m. to 5 p.m. student load basis. While there are good arguments for scheduling classrooms and laboratories on such a basis, the same rationale would not appear to apply to library utilization. The full-time student may find it convenient to take a number of his courses during the evening if they are so scheduled. There is no particular reason to believe that he will make less use of the library because of this attendance pattern than that person who attends class only during the day. Therefore, to limit the enrollment counting to an 8 a.m. to 5 p.m. basis for purposes of determining library seating may understate the true need on that campus where many full-time students pursue courses during the evening.

Library Service (Staff Work Areas, Public Service, and Processing Areas). *Proposed standard: basic complement of 400 ASF plus 140 ASF/FTE staff member.*

The data currently available do not permit detailed statistical determinations of the space provisions for library services in the junior colleges. The central tendency of college libraries, during the fall 1965, however, was approximately 160 assignable square feet per staff member. The university and state college provisions appear to be less and more, respectively;

Figure E

COMPARISON OF PROPOSED READING STATION STANDARD WITH ACTUAL READING STATION PROVISIONS IN CALIFORNIA JUNIOR COLLEGES DURING FALL 1963

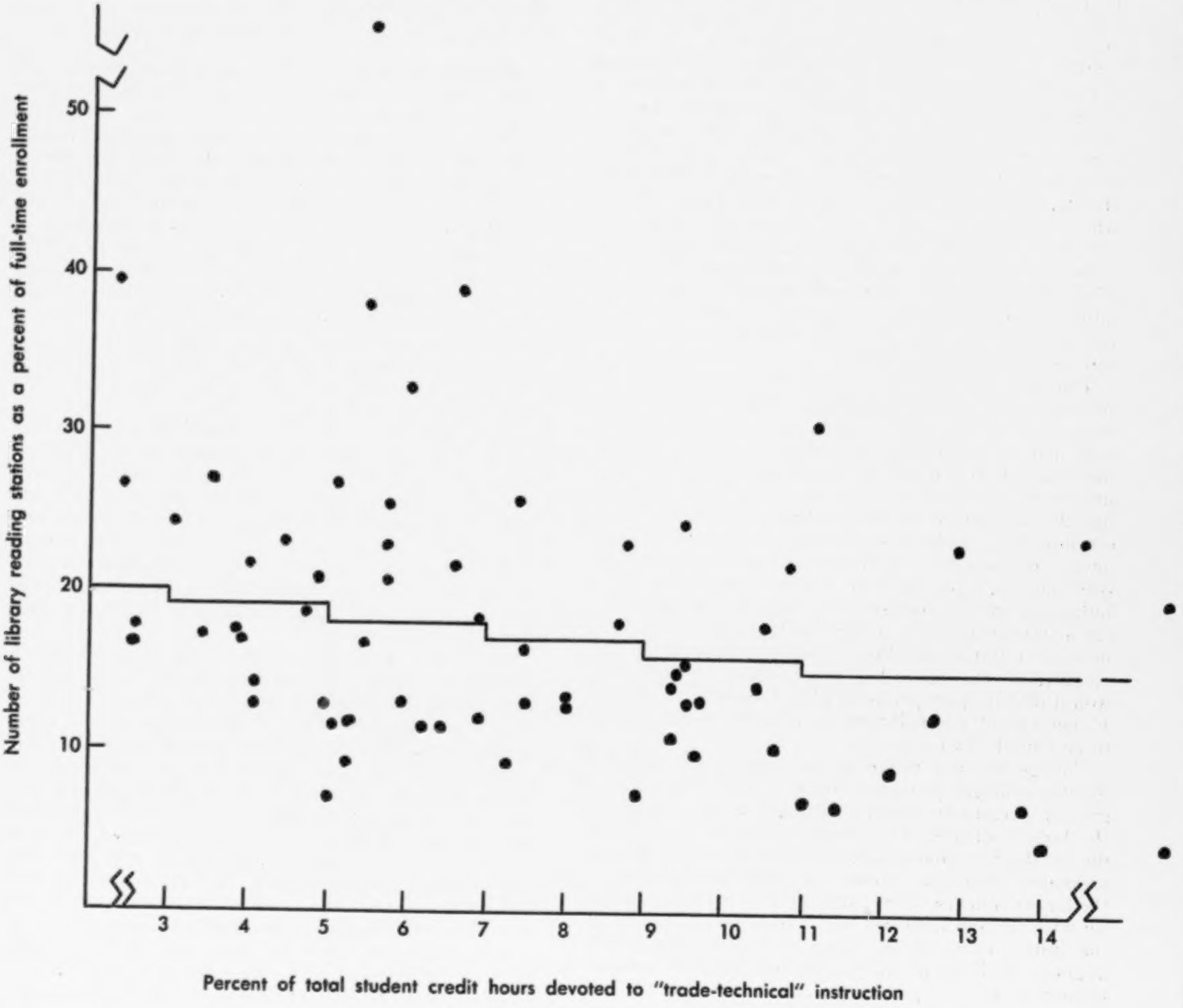
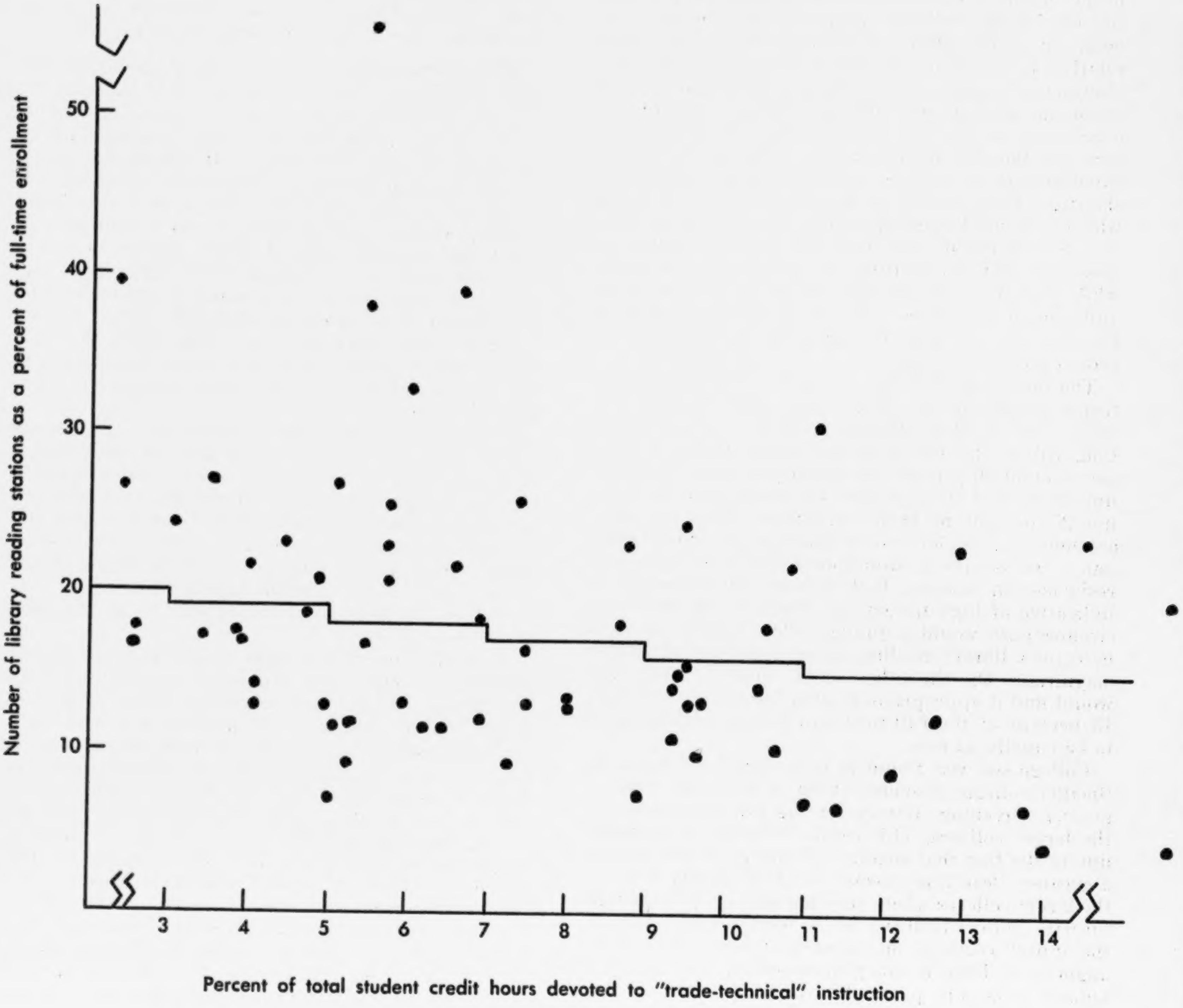


Figure E

COMPARISON OF PROPOSED READING STATION STANDARD WITH ACTUAL READING STATION PROVISIONS IN CALIFORNIA JUNIOR COLLEGES DURING FALL 1963



although this result may be due in part to different methods of space inventory.

The literature on library facility planning is equally as vague. Most documents cite the need for 125 ASF per staff member plus some undefined provision for certain public service and other basic areas. The same lack of specificity seems to be inherent with most planning standards currently in use.

Most junior college libraries will tend to be relatively small; that is, average generally around 10 staff members. This is due primarily to the existing limits to junior college campus size which are utilized in the planning of such institutions. Since they are relatively small operations (as compared to the Berkeley or Los Angeles campuses of the university, for example) they are unable to obtain the economies of scale in "library service" space utilization which the larger library may take for granted. It is therefore important (in the junior college situation) to determine the extent of those areas which appear to be fixed (are basic and generally unrelated to student growth) as opposed to those areas which must grow as the clientele and staff increase.

In order to open its doors, the college library must have at least a basic collection. This basic stock in practice has seldom been below 10,000 volumes. A basic figure of 15,000 volumes was recently recommended by the Junior College Roundtable of the California Library Association. A basic catalog housing the necessary reference cards for such a collection plus adjacent public work areas could be accommodated well within 200 assignable square feet.[1]

There would appear to be need also for fixed (basic) areas within the technical processing operation to accommodate general storage and equipment. Based upon review of existing practices, a reasonable approximation of these fixed or basic areas plus that for the above basic catalog would be 400 assignable square feet.

The most obvious variable area is that required for the desk and immediate working areas of the staff. Provision of approximately 125 assignable square feet for professional staff along with 100 ASF and 80 ASF, respectively, for clerical and student assistance would result in an overall standard of 100 ASF per full-time equivalent staff member. This figure is consistent with most planning standards currently in use for such officelike facilities. In addition to these immediate working areas, there should be provided, in the technical processing section, floor area sufficient to accommodate those materials (usually books) that are being processed. This area is also a function of the number of staff and may be calculated on an average footage per staff basis. In the public services operation, growth in the number of library users results in additions to the card catalog and increases in the total floor area that is required adjacent to reference and circulation staff work areas. Both additional areas appear to be a function of the number of both staff and users estimated for the library. Assuming that the staff expands in relatively comparable proportion to the increase in users, these areas also could be related to an assignable square feet per staff measure.

Determination of the footage per staff that might be required in addition to the minimum 100 ASF per staff working station, is aided in part by an examination of existing practices. Given, the basic complement of 400 ASF per library, an additional 40 ASF per staff member (for a total of 140 ASF per staff) results in a standard which closely approximates the current average practice in the public junior colleges. A college library with 10 staff, for example, would require a total of 1,800 assignable square feet for library service areas or an average 180 ASF per full-time equivalent staff. Given the diseconomies of scale inherent in the "smallness" of the junior college library operation, a standard of this scale appears appropriate. In a much larger library, say of 50 or 100 staff, and serving a much larger clientele, such a standard might overstate actual need.

In summary, the library service areas are split between "fixed" and "variable" provisions in the following fashion:

Activity	Provision	
Staff work areas		
1. (desk and immediate working area)		100 asf/fte staff
Public service		
2. Basic catalogue	basic complement	
3. Additions to catalogue		function of (staff, users)
4. Public space adjacent to work areas		function of (staff, users)
Processing		
5. Equipment	basic complement	
6. Storage	basic complement	
7. Storage of materials in process		function of staff
Totals	400 asf	140 asf per fte staff

Figure F provides a graphic comparison of the space per staff member allowed by the proposed standard and the actual library service space per staff reported by individual colleges for the fall 1965.

Museum. The amount of this type of area (art gallery, exhibition, etc.) included in the junior college library during the fall 1965 was practically nonexistent according to space inventories of the State Department of Education. As a result it has not been considered as a necessary part of any proposed space and utilization standard. However, if such facilities should be determined as desirable in isolated instances, space for such functions may be found by overutilizing space in the other categories.

Summary. The standards as derived are based upon the anticipated student enrollment, library staff, and the bound collection to be housed. To provide a comparison with the actual practice reported during the fall 1965, the standards were applied to the above inputs, as reported for that date, and a total "standard" assignable square footage calculated for each of the 70 California junior colleges. This standard ASF

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[1] See Metcalf, *op. cit.*, pp. 250–255.

Figure F

COMPARISON OF PROPOSED "LIBRARY SERVICE" STANDARD WITH ACTUAL AREAS PER STAFF REPORTED FOR CALIFORNIA JUNIOR COLLEGES, FALL 1965

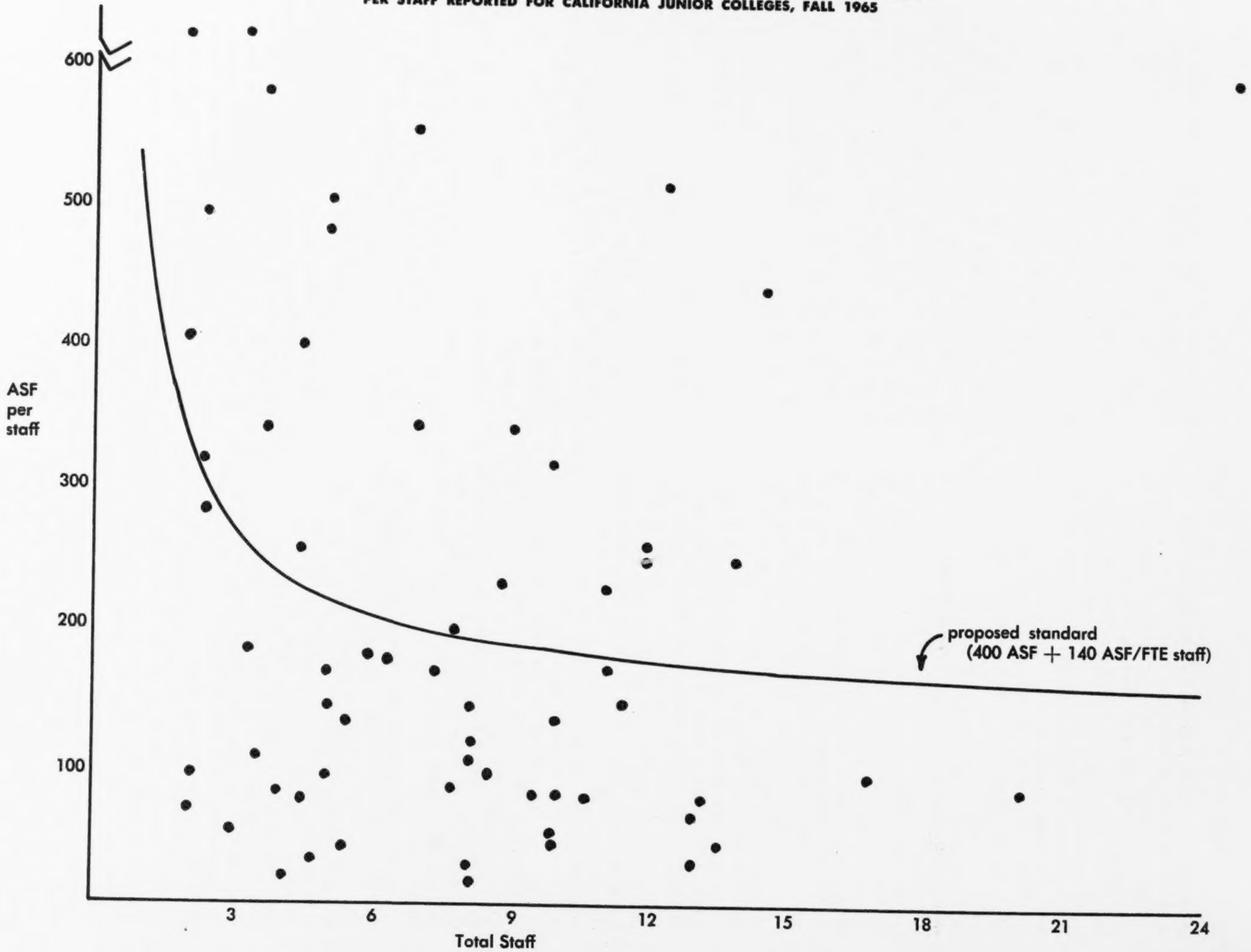
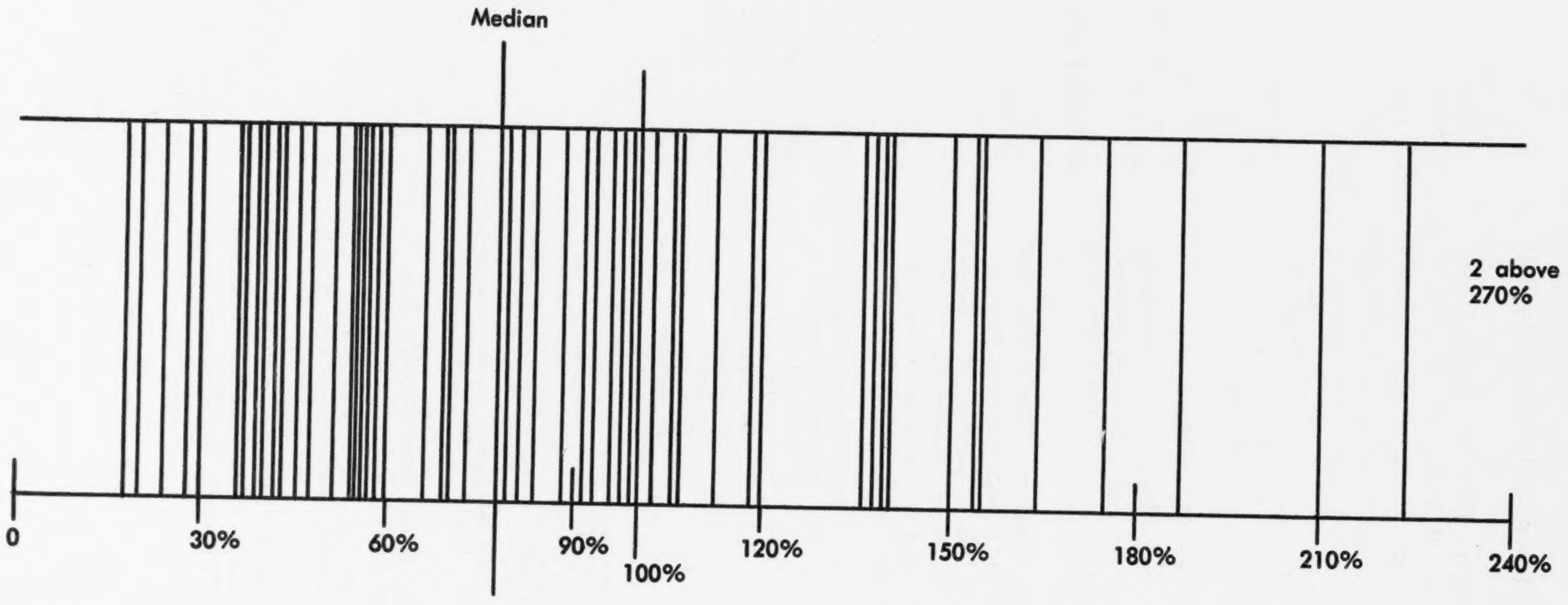


Figure G

JUNIOR COLLEGE LIBRARY FACILITIES: ACTUAL CAPACITY AS PERCENT OF CALCULATED CAPACITY, FALL 1965 *



* Each vertical line represents the location of a junior college on the scale.

allowance was then compared to the actual reported ASF in the following fashion:

actual ASF ÷ standard ASFX × 100 = library capacity as a percent of need

The results appear in Figure G. It may be noted that according to the proposed standards, 49 colleges fell short of having sufficient space to provide for the level of activity reported. Twenty-one colleges reported facility sufficient to accommodate 100 percent or more of their operations. The median (average) college reported 78 percent of needed capacity.

SUMMARY OF PROPOSED STANDARDS

1. **Housing the Collection (Stack).** 0.10 assignable square foot (ASF) [1] per volume (of which approximately 75 percent would be house bound items, with 25 percent for unbound items).

2. **Area for Reading Stations (Study Hall and Carrel).** a. 25 assignable square feet per station.

b. Number of stations: 15–20 percent of estimated full-time enrollment (students taking 12 or more units), scheduled according to the relative emphasis of college curriculum on "trade-technical" instruction:

Stations as percent of full-time enrollment [a]	*Percent of total student credit hours devoted to "trade-technical" courses* [b]
15%	11% and greater
16	9 and 10%
17	7 and 8
18	5 and 6
19	3 and 4
20	less than 3

[a] The measure of full-time enrollment is chosen as being the most relevant indication of reading station need. Full-time enrollment may also be converted to weekly student contact hours (WSCH) for purposes of comparing library capacity with instructional capacity (measured in WSCH).

[b] Courses such as building trades, engineering technology, textile technology, dry cleaning, etc., are within "trade-technical"; a complete list appears in Appendix B. Appendix B also lists the results of applying this standard to reports of student credit hours offered by individual junior colleges during the fall 1963.

For example, a college which devoted more than 11 percent of total student credit hours offered to "trade-technical" instruction would plan for a sufficient number of study stations to seat 15 percent of anticipated full-time enrollment.

3. **Library Service (Staff Work Areas, Public Service and Processing Areas).** Basic complement of 400 ASF, plus 140 ASF/FTE staff [2] based upon:

Function	*Provision*
Staff work areas (desk and immediate working area)	100 ASF/FTE staff
Public service	
Basic catalog	basic complement
Additions to catalog	function of (staff, users)
Public space adjacent to work areas	function of (staff, users)
Processing	
Equipment	basic complement
Storage	basic complement
Storage of materials in process	function of staff

For example, a college library with 10 staff would require a total of 1,800 assignable square feet for "library service" or an average of 180 ASF per full-time equivalent staff member.

4. **Special Accommodations.** Audiovisual (general and television)

No specific standards appear possible for such areas. Each installation should be considered on the basis of the program inputs involved and may be added to the library in addition to the above facilities.

APPLICATION OF STANDARDS

Two additional factors, which relate to the actual administration of the proposed standards must be mentioned. These are (1) the method of space inventory and (2) "lead time" considerations.

For a junior college planning the second or third increment to library capacity on its campus, the proposed standards must be applied to existing floor areas which have been accurately inventoried if the standards are to assist in the equitable allocation of space. Space categories are clearly defined by the State Department of Education and would appear, on the surface, to be fairly unambiguous. Large variations in the reported use of certain areas by individual colleges, however, suggest that not all districts inventory their library facility in the same manner. The distinction between what is assignable versus nonassignable floor area in the library is less clear than in the instructional facility. This is particularly true in the newer library facilities. Design trends are toward more open areas adjacent to entrances. What might have been a walled corridor in an older facility is represented by some portion of an open area in a newer library. To the extent that such distinctions are not established on a comparable basis by the several junior colleges, the proposed standards will not measure need accurately from either a relative or absolute standpoint.

In recent planning of library facilities in California public higher education, the total assignable square footage of a building has generally constituted some 70 percent of the gross floor area. The gross floor area is defined as "the sum of the areas at each floor level included within the principal outside faces of exterior walls, neglecting architectural setbacks and projections." [3] This gross floor area concept thus encompasses both the assignable square feet and nonassignable square feet categories cited in the standards in Sections II and III.

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[1] The assignable square feet include those areas which are "usable" for the functions described. Not included in this usable category would be such areas as the main lobby (excluding card catalog area), elevators, stairs, walled corridors, restrooms, and areas accommodating building maintenance services.

[2] FTE staff: full-time equivalent staff, including professional, clerical, *and* student assistance.

Note: Space for programmed learning facilities such as language laboratories, etc., should be allocated (as much as is possible) to the instructional departments for which activities are conducted and not considered as part of library space, even though physically located in the library.

[3] See Instructions for Forms P-1 and P-2, *California Public Higher Education Cost and Statistical Analysis*, CCHE, 1963.

The second relevant area of concern in the application of the proposed library space standards is the concept of appropriate "lead time." "Lead time" is meant to be the number of years beyond the occupancy date for which the demand level (i.e., expected volumes, students, staff) is established and the library sized for optimum use (according to the standards). Most instructional facilities, i.e., classroom and laboratory buildings are planned to accommodate the level of instructional activity anticipated two years (and sometimes longer) after the building is initially occupied. In this manner colleges are able to construct structures of reasonable size rather than having, each year, to open several small facilities to accommodate the enrollment growth over the prior year. The library activity is less mobile than are those classroom and office activities in the instructional departments. That is, it is more difficult to relocate library functions (with the possible exception of reading stations) in other facilities on campus than it would be to relocate the classroom and office functions of, say, the Department of Sociology when it was found that the building housing this department was filled beyond its capacity. Therefore, the library building should have incorporated in its planned size a slightly longer "lead time" than would be required for instructional departments accommodated in classroom and office buildings. A "lead time" of not less than *three years* beyond the date of occupancy appears to be a reasonable minimum for the typical junior college. Shorter lead times, especially at a rapidly growing college, bring about the necessity for adding too many small increments to the basic library facility with probable unnecessary capital costs as well as disruptions to the functioning of library activities when such increments are being constructed.

An additional aspect of the "lead time" planning concept relates to average capacity which is provided a function over the long run. If in the planning of physical plant capacity for the library an increment is scheduled (with appropriate lead time) for occupancy each time the facility is filled to its capacity, there will be, over the long run, an average-facility provision which exceeds need by the yearly overcapacity contained in the lead time. This situation is portrayed graphically in Figure H. The model consists of a junior college opening in the first year (t_1) with 1,000 enrollment and adding 250 students annually until a total student enrollment of 3,750 is reached by the 12th year (t_{12}) of operation (or 7,500 in the 24th year). When planning is geared to a three-year "lead time" and library plant capacity is never allowed to fall below need, the result is an annual average capacity over the 12 years that is 121 percent of need. Two relatively small increments to the initial plant are required by the 12th year and three more additions would be required to accommodate the library function by the time the campus reached its ultimate enrollment of 7,500.

Figures I, J and K represent alternative planning procedures given the same college enrollment model.[1] In Planning Alternative II, (Figure I), the library capacity is allowed to fall slightly below 100 percent of need prior to the construction of another plant increment. Here one addition will be required during the first 12 years with two more needed to take the campus to its ultimate-enrollment library requirement. The unit costs of facility construction may be less than in the Alternative I procedure due to the larger sized units. Further, the average capacity provision (111 percent for 12 years) is more closely approximated to longrun requirements. The major question in this programming relates to the ability of the library to function properly when capacity represents 78 percent of needed area (as in year t_6). In such a situation, adjacent buildings may be utilized more extensively to accommodate reading station requirements. Technical processing staff could also be accommodated in adjacent facilities temporarily (with some probable increase in operating costs). The collection, to be sufficiently accessible to users, however, must continue to be housed in the library. The standard provision of 125 volumes per section allows some room for expansion in the number of volumes held without increasing total stack area requirements. It is doubtful, however, that any provision much below 80 percent of need (or approximately 150 volumes per section) would be operationally feasible unless additional stack space were acquired by displacing some other library function into another facility. Such additional dislocations would doubtless be undesirable.

The Planning Alternative III (in Figure J) examines the possibility of sizing the library for a six-year "lead time" with unused areas being scheduled for interim occupants who would later be phased out when the total space was required by library activities. Normally such interim occupants would be provided office and/or classroom areas. (The feasibility of building in laboratories, with the required plumbing and extensive stationary equipment, and later remodeling them into open library areas is extremely doubtful.) The resulting longrun plant utilization (112 percent) is similar to that in the previous alternative (II); however, the extent and danger of "undercapacity" operation is less significant. Only two additions are required for total campus growth, one being required during the first 12 years. After the 5th and 14th years remodelings would be required to convert areas formerly occupied by interim functions into library areas. The added units are larger than in either Alternatives I and II and would most likely exhibit smaller unit construction costs. The added construction costs of remodeling, however, must also be calculated along with the value of the disruption to normal library functioning caused by such work.

Figure K represents the alternative (IV) of constructing an extremely large initial plant which would accommodate approximately one-half the total campus growth. While only one additional unit (of similar size) would be required (in the 13th year of operation), the arrangement is rather inefficient as indicated by the average annual utilization of 177 percent. The large sizes of the building units would probably

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[1] An infinite variety of planning procedures are possible. Only four of the most obvious alternatives appear here.

Figure H

LIBRARY PLANNING ALTERNATIVE I
(lead time only)

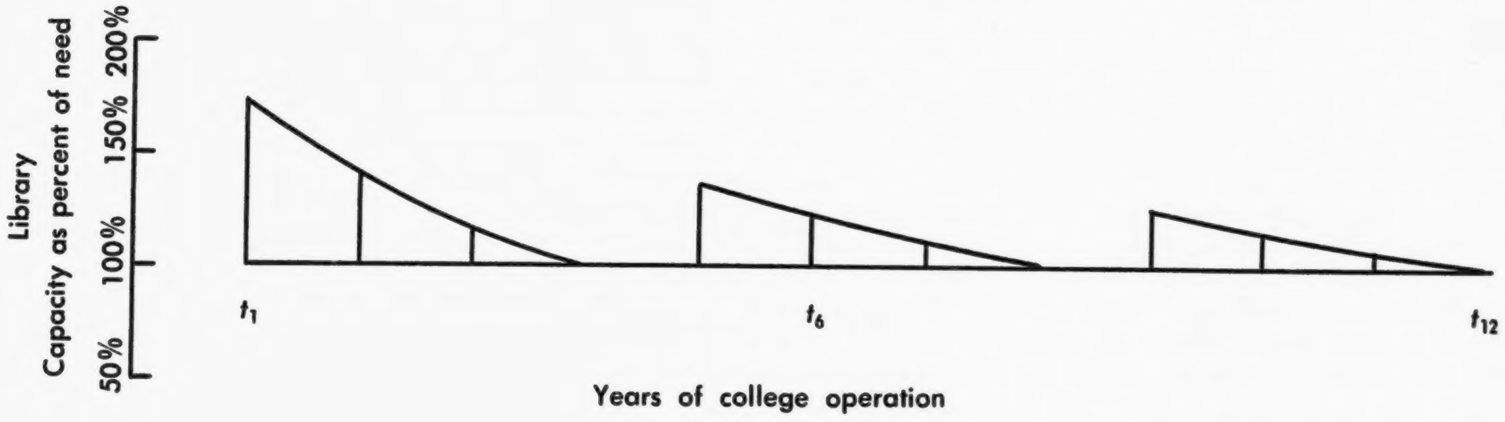


Figure I

LIBRARY PLANNING ALTERNATIVE II
(lead and lag time)

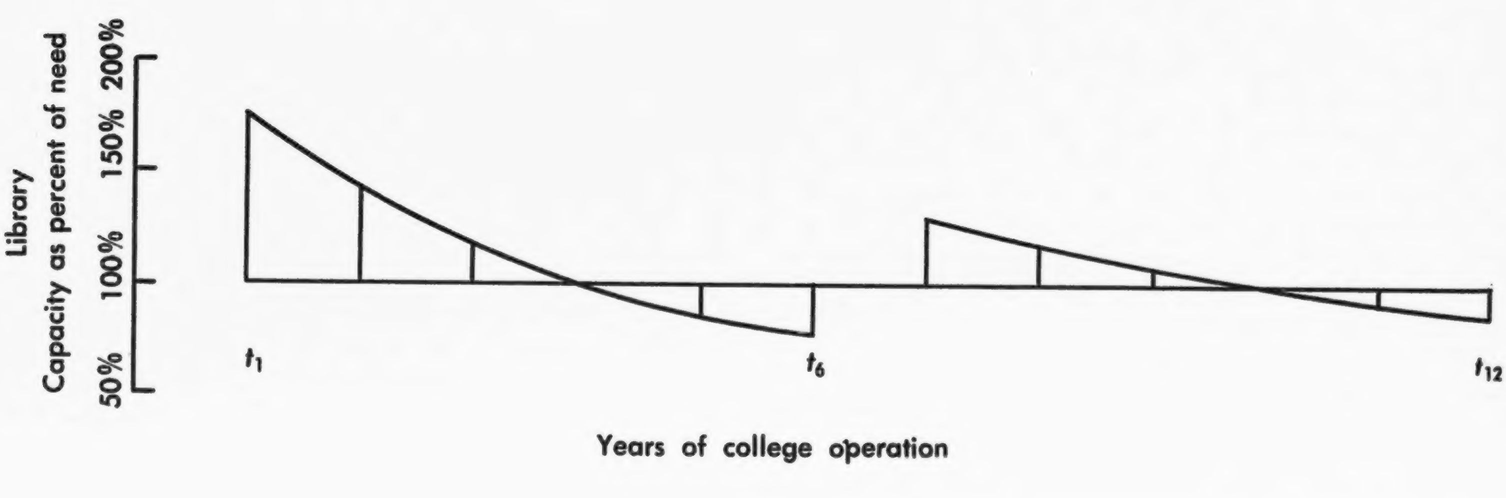


Figure J

LIBRARY PLANNING ALTERNATIVE III
(interim occupancy)

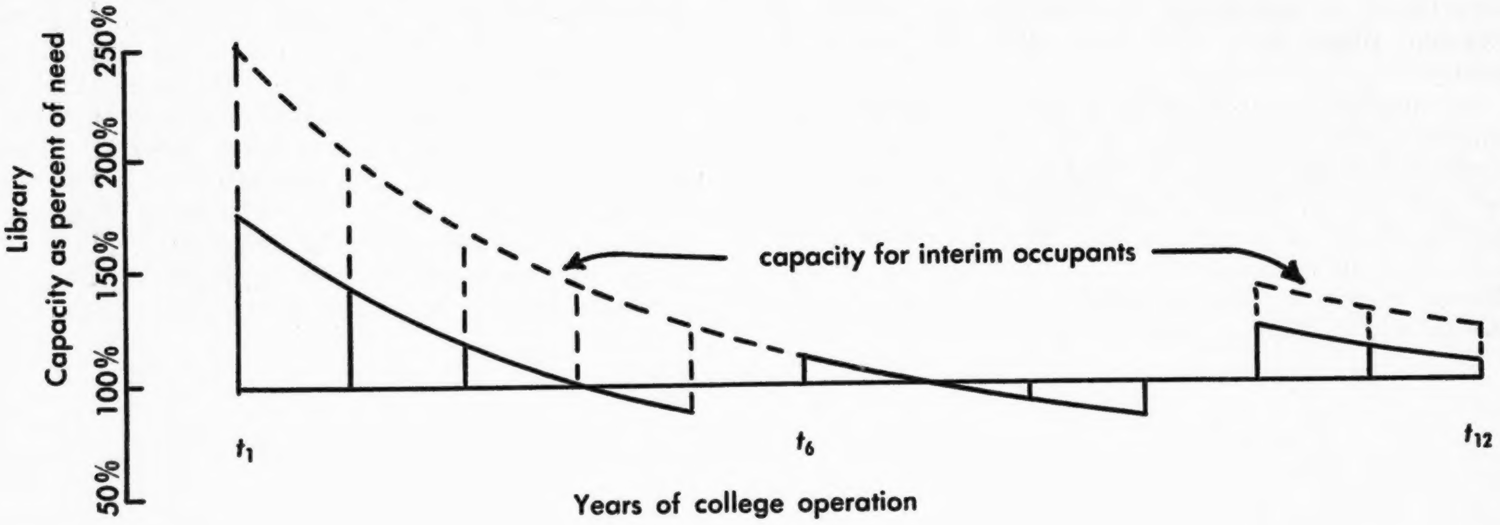
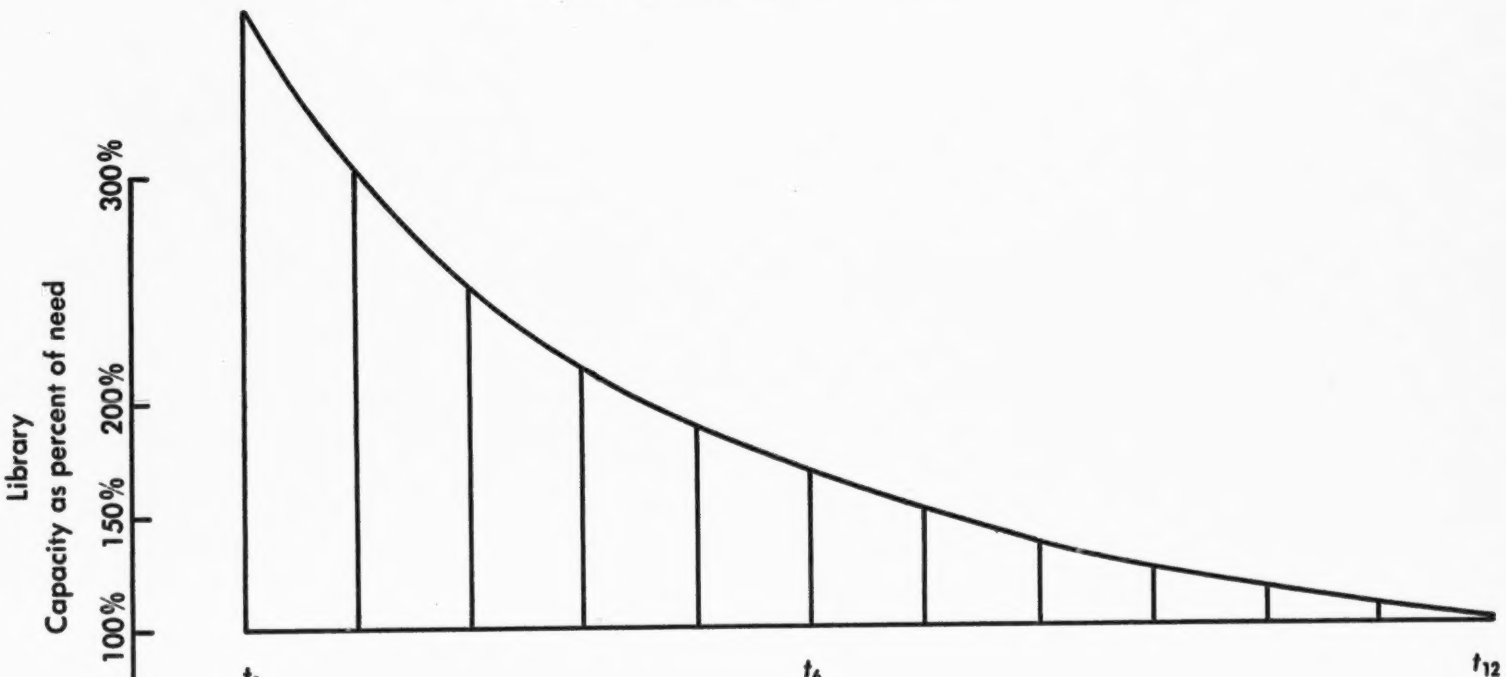


Figure K

LIBRARY PLANNING ALTERNATIVE IV



result in some economies in unit costs of construction. The unused capacity could not be recovered, however, and would represent a suboptimal allocation of capital funds if, as a result, other activities on campus, instructional or otherwise, were forced to operate in physical plant areas that were short of needed capacity.

In summary, Alternatives I and IV result in less efficient plant utilization and, in the case of I, relatively frequent disruption of library operations with lessened service levels and (probably) increased operating costs. Alternatives II and III appear to be more appropriate bases for the planning of campus library facilities, both in terms of more efficient utilization of the library structure(s) and more reasonable incremental increases in library capacity. Of these two alternatives, the ''interim occupancy'' method, Alternative III, may provide the best solution through the vehicle of greater plant flexibility as well as less frequent construction requirements. In the final anaylsis, however, numerous considerations must be taken into account to determine the ''best'' solution for any given campus Excessive costs of remodeling or lack of need to house interim occupants might well rule out the possibility of planning according to Alternative III. Whatever the solution chosen, it should again be emphasized that ''lead times'' of less than three years would seem unappropriate in the planning of junior college libraries.

SECTION V

SUMMARY OF FINDINGS

This study (1) summarizes the degree of utilization of classrooms and laboratories in the three public segments and develops new standards which can be used for all three segments, (2) reviews practices and standards in planning office space for the three segments with proposals for standards for the junior colleges and (3) presents the available data on library facilities in the three segments to develop rocommendations for standards and guidelines in planning such facilities for junior colleges.

UTILIZATION OF CLASSROOMS AND LABORATORIES

General Purpose Classrooms and Seminars. For the fall of 1963, the average classroom size for the university, the state colleges and the junior colleges in terms of numbers of stations within the rooms was 59, 41 and 46 respectively. During the normal 8 a.m. to 5 p.m. day and throughout the week, Monday through Friday, these classrooms were used, on the average, 15.4, 18.1 and 13.6 hours per week respectively. During those hours when rooms were scheduled the percent of available stations which were in use was 69 percent, 72 percent and 57 percent respectively. The assignable square feet per station in classrooms and seminars for the university, the state colleges and the junior colleges was 17.3, 18.3 and 13.4 square feet respectively.

Laboratories. The sizes of laboratories varied greatly according to the subject field area. During the normal 8 a.m. to 5 p.m. day and throughout the week, Monday through Friday, lower division laboratories were used at the university, the state colleges and the junior colleges, on the average, 19.4, 18.6 and 18.9 hours per week respectively. Upper division laboratories were utilized about 5 hours per week less than lower division laboratories. During those hours when class laboratories were scheduled the percent of available stations in use was 73 percent, 85 percent and 66 percent at the university, state colleges and the junior colleges respectively. Space-per-station data in the different subject field areas varied according to the type of laboratory. Table V in the appendix shows the ranges among campuses in space per station according to subject field.

THE ESTABLISHMENT OF UTILIZATION AND SPACE STANDARDS

The recommended standards for classrooms and laboratories combines the utilization components with the space-per-station component for a maximum amount of flexibility. The space-per-station standard for classrooms and seminars was established at 15 square feet per station. Space-per-station standards for the various kinds of laboratories is presented in Table 2 of the report.

The utilization components for the standard are as follows:

	Hours/week	*Station occupancy*
Classrooms and seminars	34	66%
Laboratories		
Lower division	25	85
Upper division	20	80

The above components for classrooms and seminars combine as follows:

$$\frac{15 \text{ sq. ft./stn.}}{34 \text{ hr./wk.} \times 0.66 \text{ (stn. occ.)}} \times 100 = 67 \text{ sq. ft. per weekly student contact hour}$$

Small Colleges. Small, isolated junior colleges with less than 1,000 full-time students for at least five years as of May 1966 attending classes from 8 a.m. to 5 p.m. should be allowed 20 percent additional space per weekly student contact hour for both classrooms and laboratories.

Office Standards

The office standards for the University of California and the California state colleges appear to be reasonable and adequate. Suggested standards and guidelines for junior colleges are as follows:

	All junior colleges ASF/instructional FTE	*"Smaller" junior colleges* [1] *ASF/instructional FTE*
Standard		
For office space planning, collegewide basis	140	160
Guideline		
Academic office: ASF/station	80	80
Guideline		
Academic office plus other office: ASF/S instructional FTE	105	110
Guideline		
Academic office: ASF/teaching FTE	63	58

[1] "Smaller" for this purpose is defined as campuses with fewer than 1,000 full-time students, and in existence for five years as of May 1966.

Libraries

Both the university and the state colleges have established library facilities standards. The university has followed the *Restudy* standards for the most part. However, there is a need for some more specificity in certain areas in the standards for both segments. Differences among campuses as to the amount of student reading spaces needed should be examined further, and space allocations for new types of library space need definition and evaluation. Consultants from the State Department of Education have often advised the junior colleges in planning library facilities, but no official standards have existed up until this time.

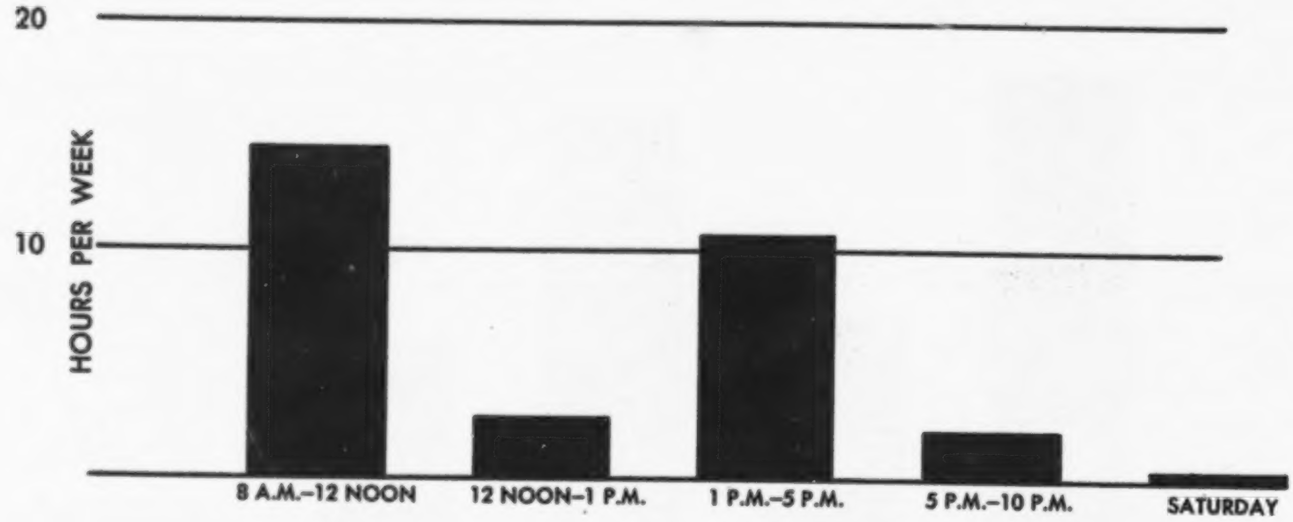
Establishment of Library Standards for Junior Colleges. In the formulation of space and utilization standards for junior college libraries, it was found that reasonable approximations of the floor areas required by the growing audiovisual and programmed learning facilities are not presently possible. Yet, while there is large variation in the total library plant provision in individual junior colleges, certain other, more traditional, areas appear to receive, in practice, relatively constant allowances. These areas are: (1) stack areas housing books, (2) floor areas provided for reading stations, and (3) the immediate desk and working areas provided staff. Uniform standards are proposed for these units.

The relative smallness of the average junior college library indicates that a basic complement of library service area (in addition to immediate staff areas) should be provided in the planning of such a facility. Further, differences in the characteristics of individual colleges require that a range (rather than average unit) be utilized in determining appropriate reading station provisions. During this study several variables describing institutional characteristics were correlated with actual junior college reading station provisions. Only one, however, the percentage of curriculum devoted to "trade and technical" instruction produced reasonable and statistically significant results. Thus, this variable is proposed as an empirical basis to determine individual college reading station allowances within a standard range of "stations numbering 15 percent to 20 percent of full-time student enrollment." Other variables, such as methods of instruction, accommodations in adjacent facilities, location of campus, etc., while not currently quantifiable, may be no less important, however.

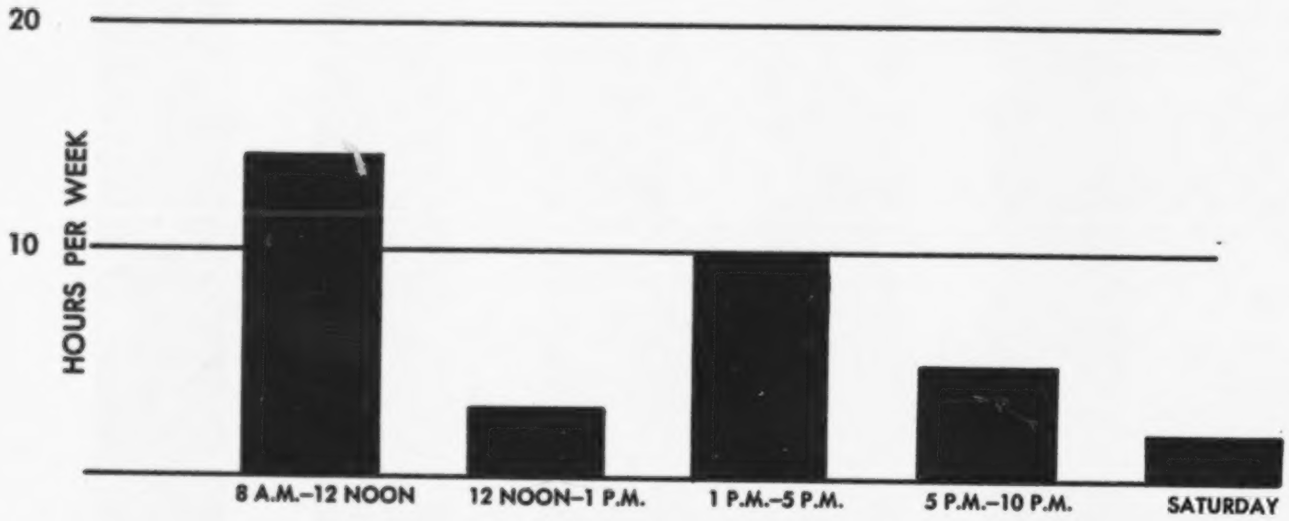
Comparison of facility needs (as calculated by the standards proposed in this study) with the actual library floor area provisions in individual California public junior colleges during the fall 1965, revealed that of 70 colleges examined, 49 colleges fell short of having sufficient space to provide for the level of activity reported.

Figure 1

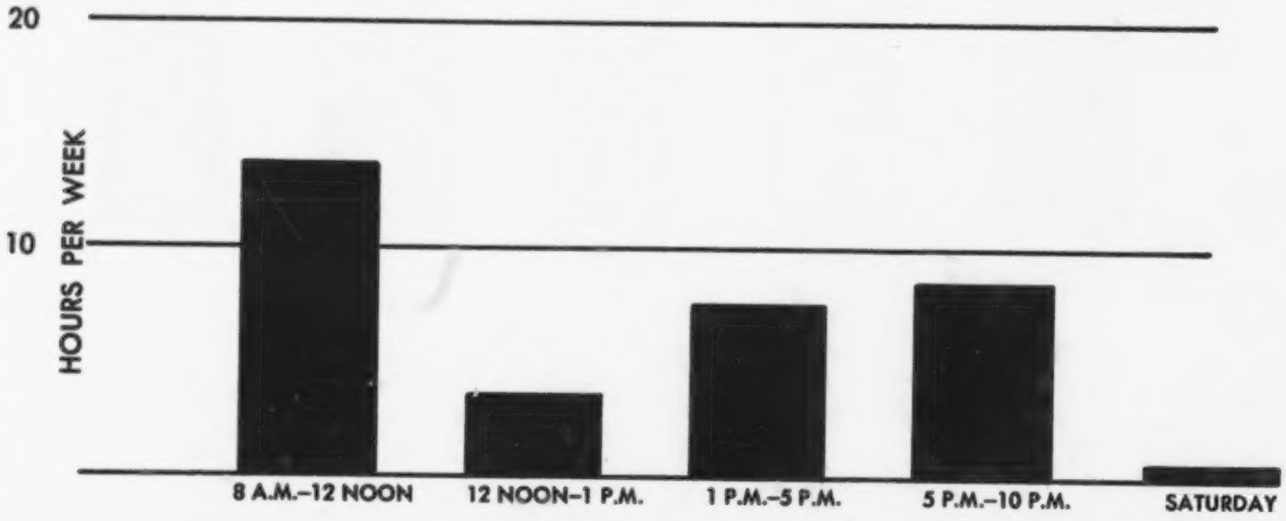
AVERAGE HOURS PER WEEK IN SELECTED PERIODS OF THE DAY CLASSROOMS ARE IN USE, FALL 1963



UNIVERSITY OF CALIFORNIA



CALIFORNIA STATE COLLEGES



CALIFORNIA JUNIOR COLLEGES

Figure 2

AVERAGE HOURS PER DAY CLASSROOMS ARE IN USE, CALIFORNIA JUNIOR COLLEGES, FALL 1963 (8 A.M.–10 P.M.)

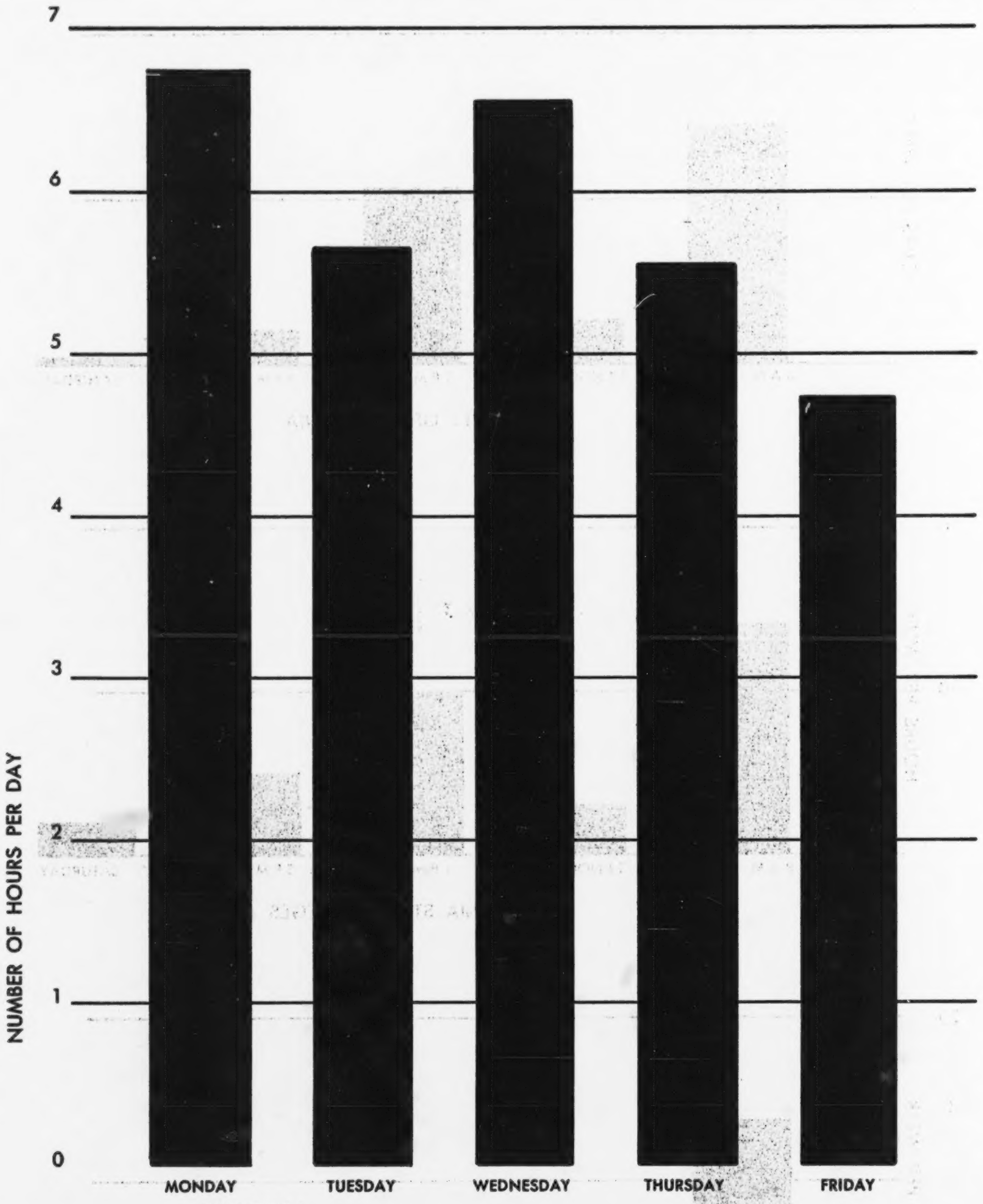


Figure 3

AVERAGE HOURS PER DAY CLASSROOMS ARE IN USE, CALIFORNIA STATE COLLEGES, FALL 1963 (8 A.M.–10 P.M.)

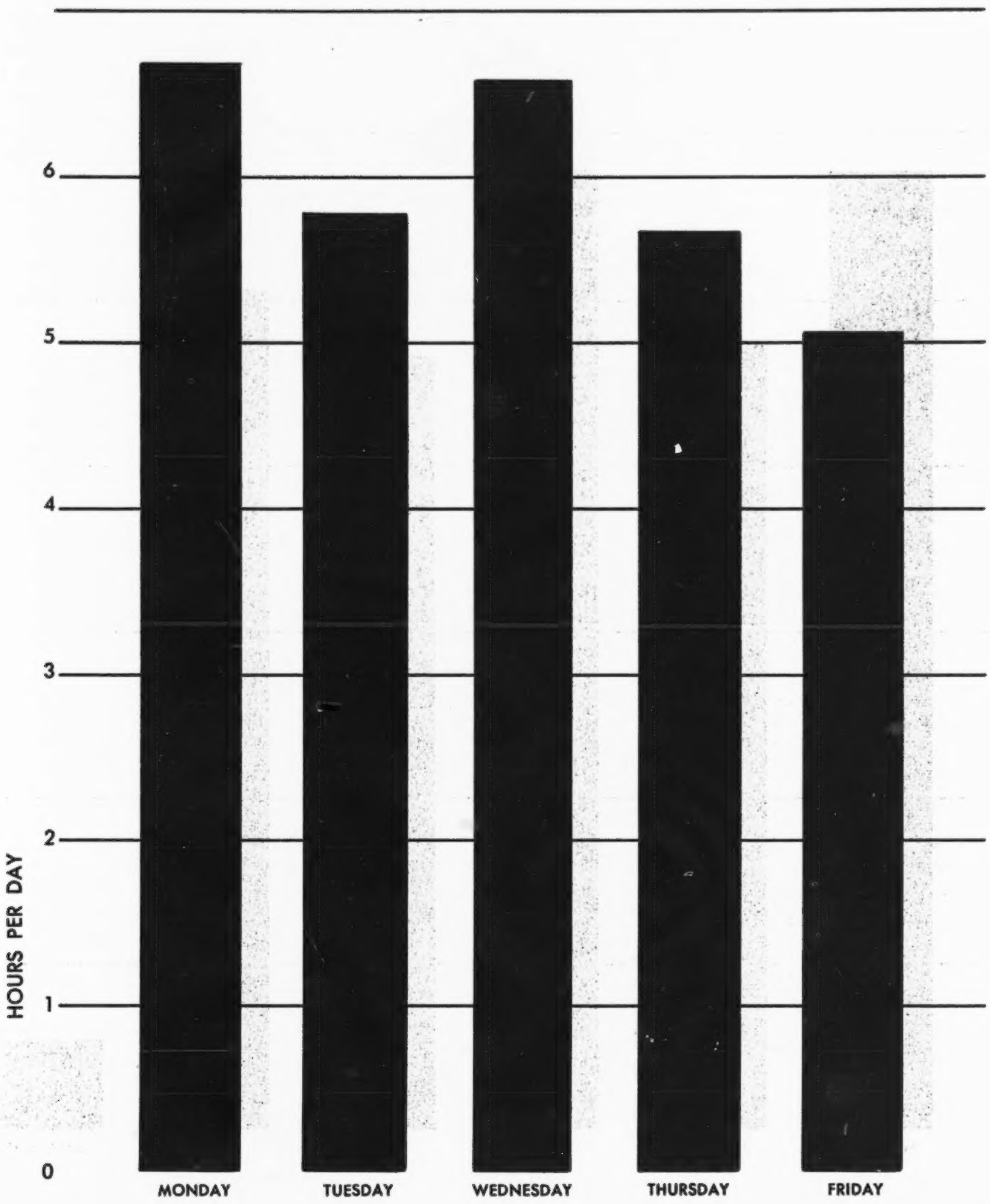


Figure 4

AVERAGE HOURS PER DAY CLASSROOMS ARE IN USE, UNIVERSITY OF CALIFORNIA, FALL 1963 (8 A.M.–10 P.M.)

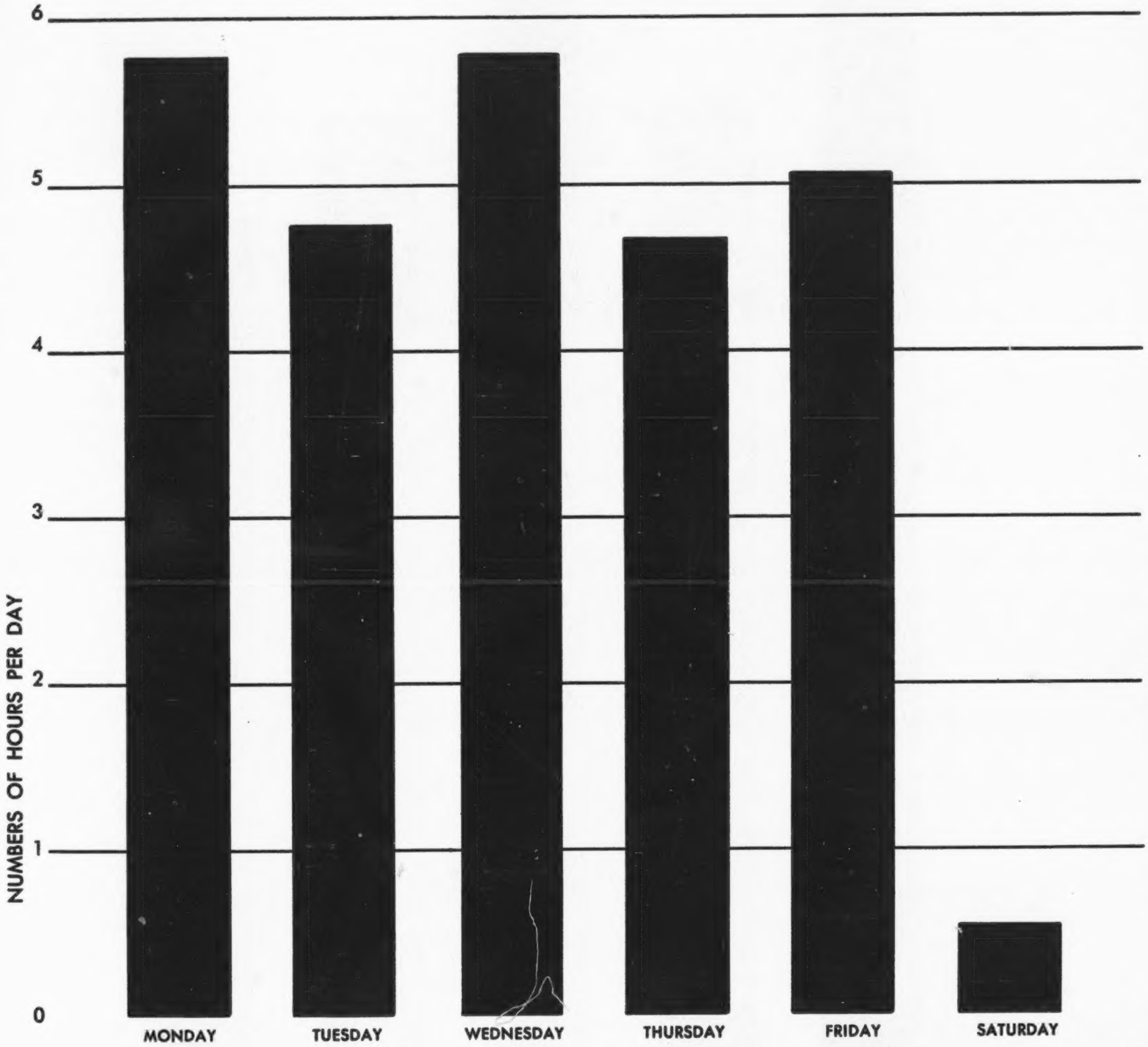
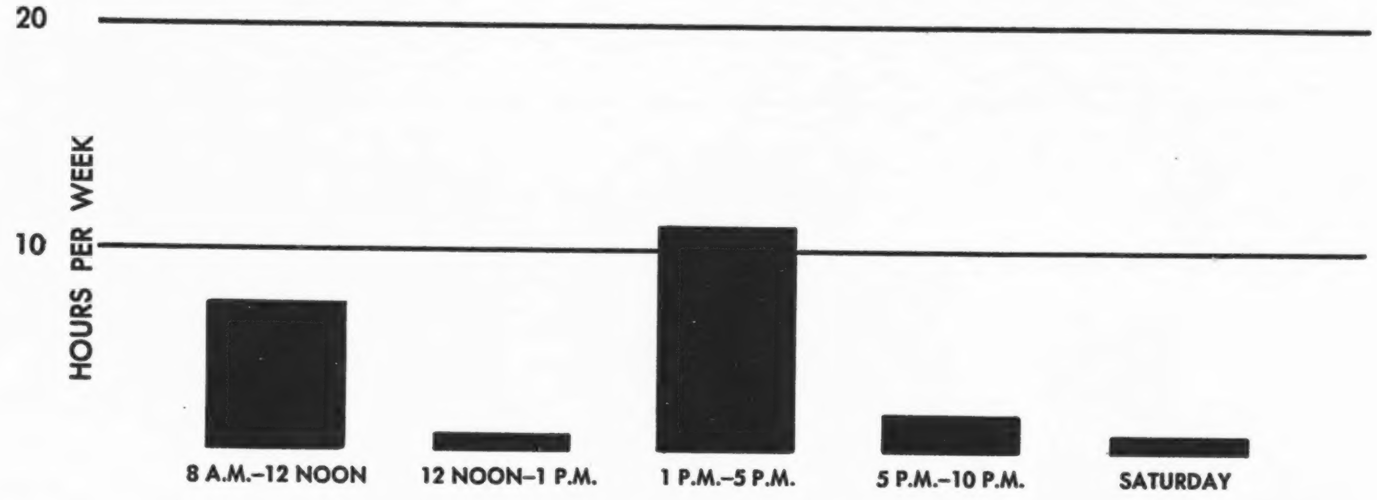
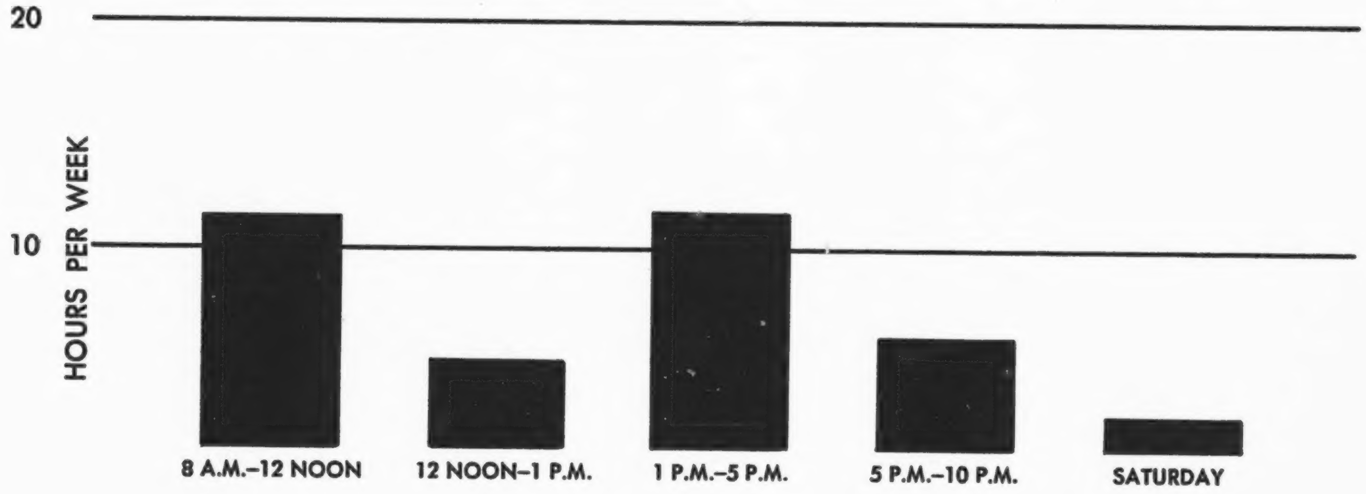


Figure 5

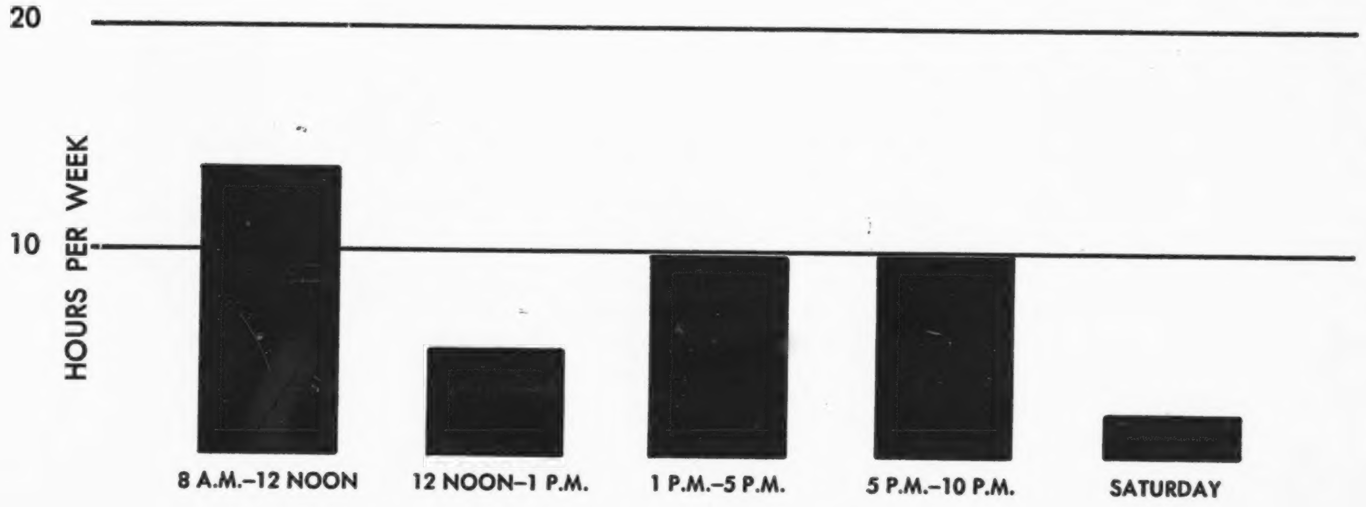
AVERAGE HOURS PER WEEK IN SELECTED PERIODS OF THE DAY LABORATORIES ARE IN USE, FALL 1963



UNIVERSITY OF CALIFORNIA



CALIFORNIA STATE COLLEGES



CALIFORNIA JUNIOR COLLEGES

Figure 6

AVERAGE HOURS PER DAY LABORATORIES ARE IN USE, CALIFORNIA JUNIOR COLLEGES, FALL 1963 (8 A.M.–10 P.M.)

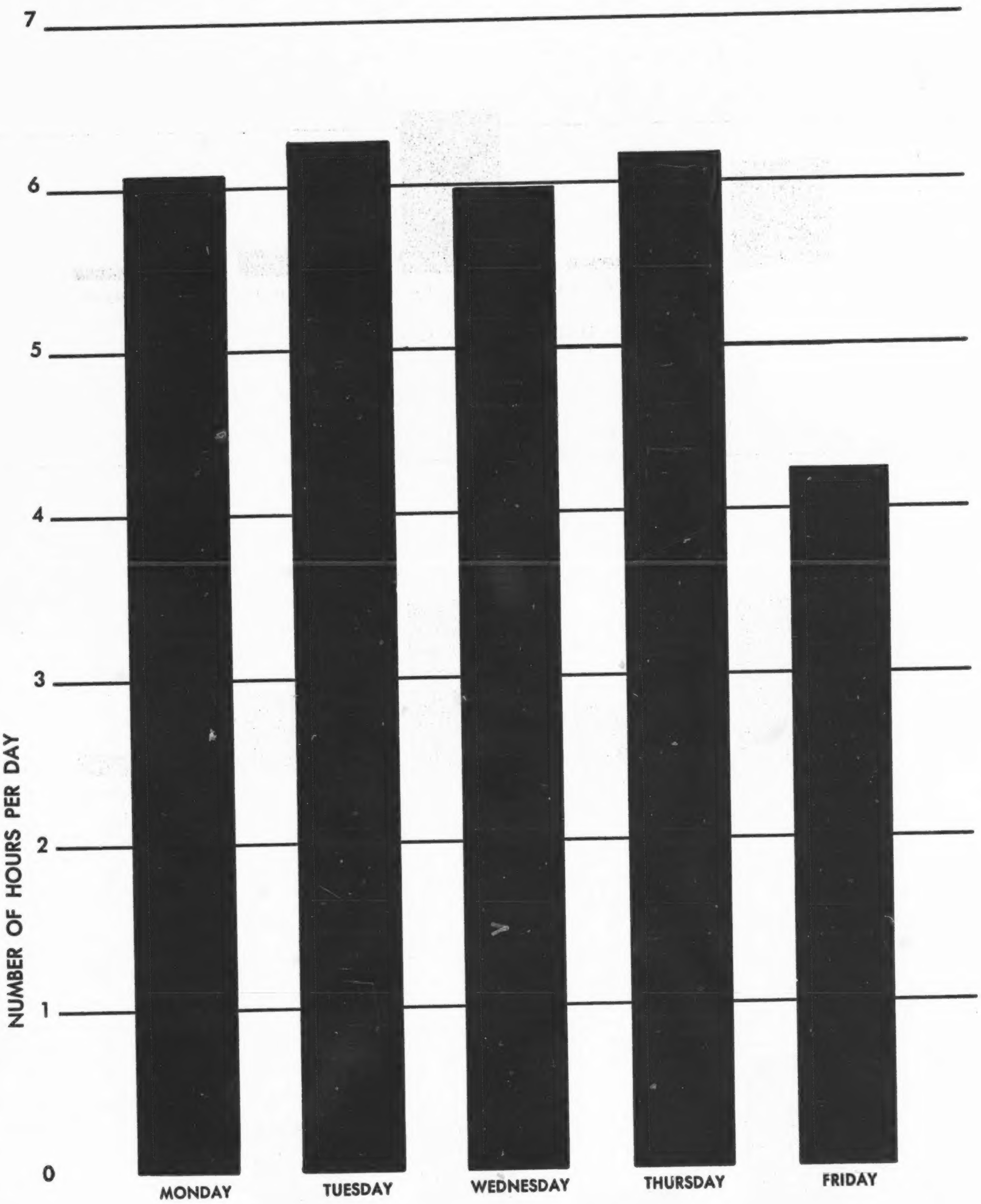


Figure 7

AVERAGE HOURS PER DAY LABORATORIES ARE IN USE, CALIFORNIA STATE COLLEGES, FALL 1963 (8 A.M.–10 P.M.)

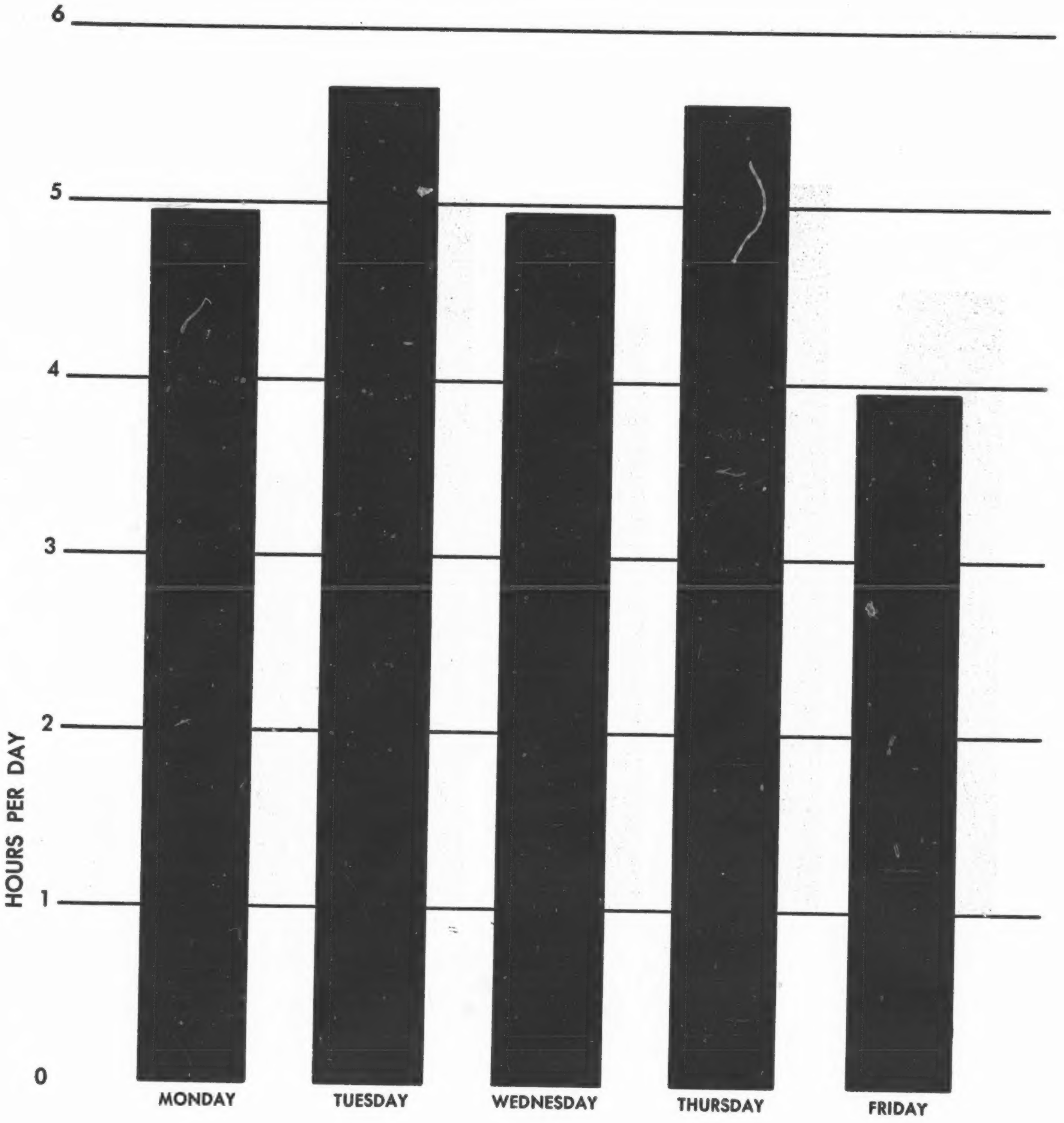


Figure 8

AVERAGE HOURS PER DAY LABORATORIES ARE IN USE, UNIVERSITY OF CALIFORNIA, FALL 1963 (8 A.M.–10 P.M.)

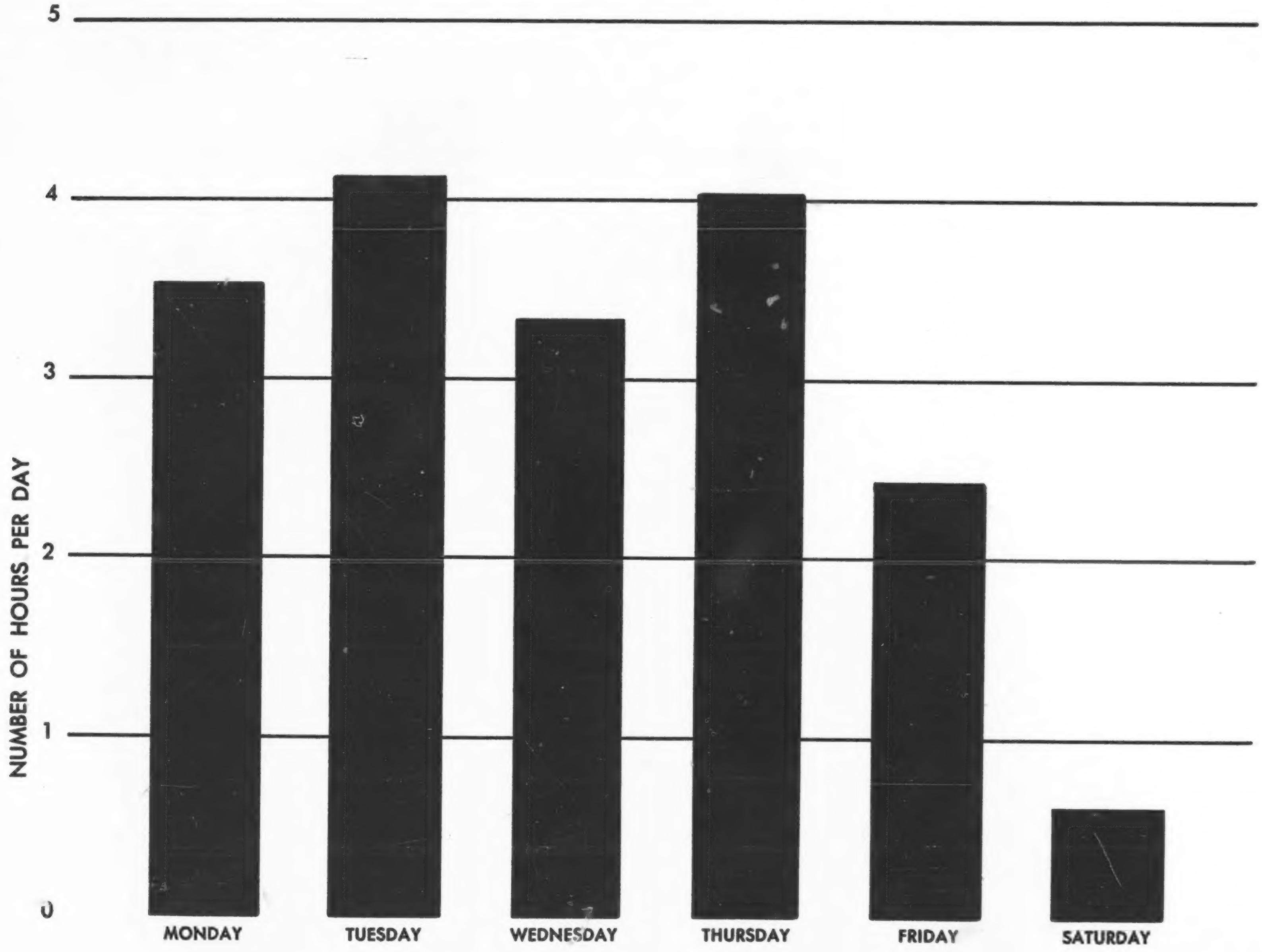


Figure 9

DISTRIBUTION OF CLASSROOM SIZES ACCORDING TO NUMBER OF STATIONS REPORTED, CALIFORNIA JUNIOR COLLEGES, FALL 1963

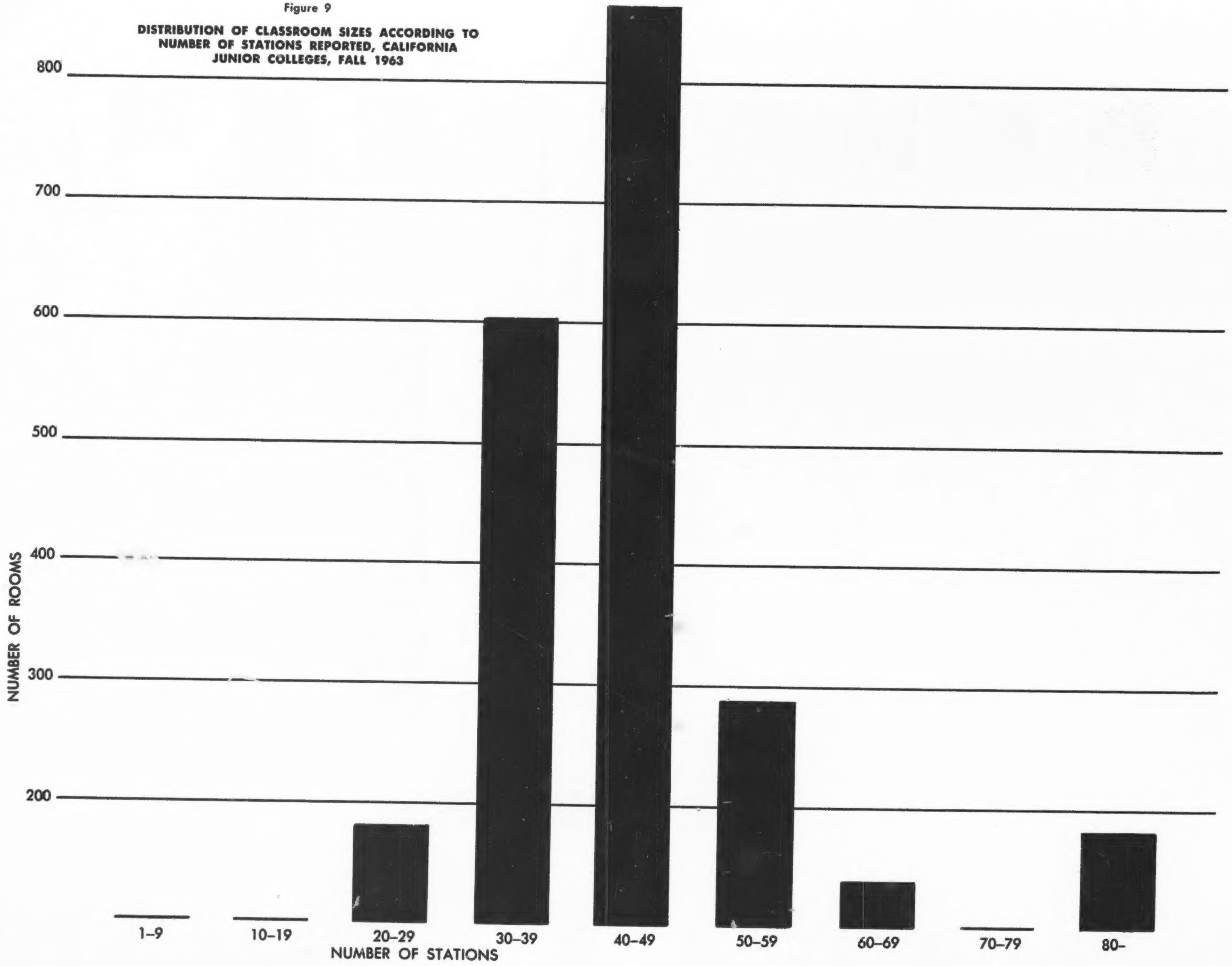


Figure 10

DISTRIBUTION OF CLASSROOM SIZES ACCORDING TO NUMBER OF STATIONS REPORTED, CALIFORNIA STATE COLLEGES, FALL 1963

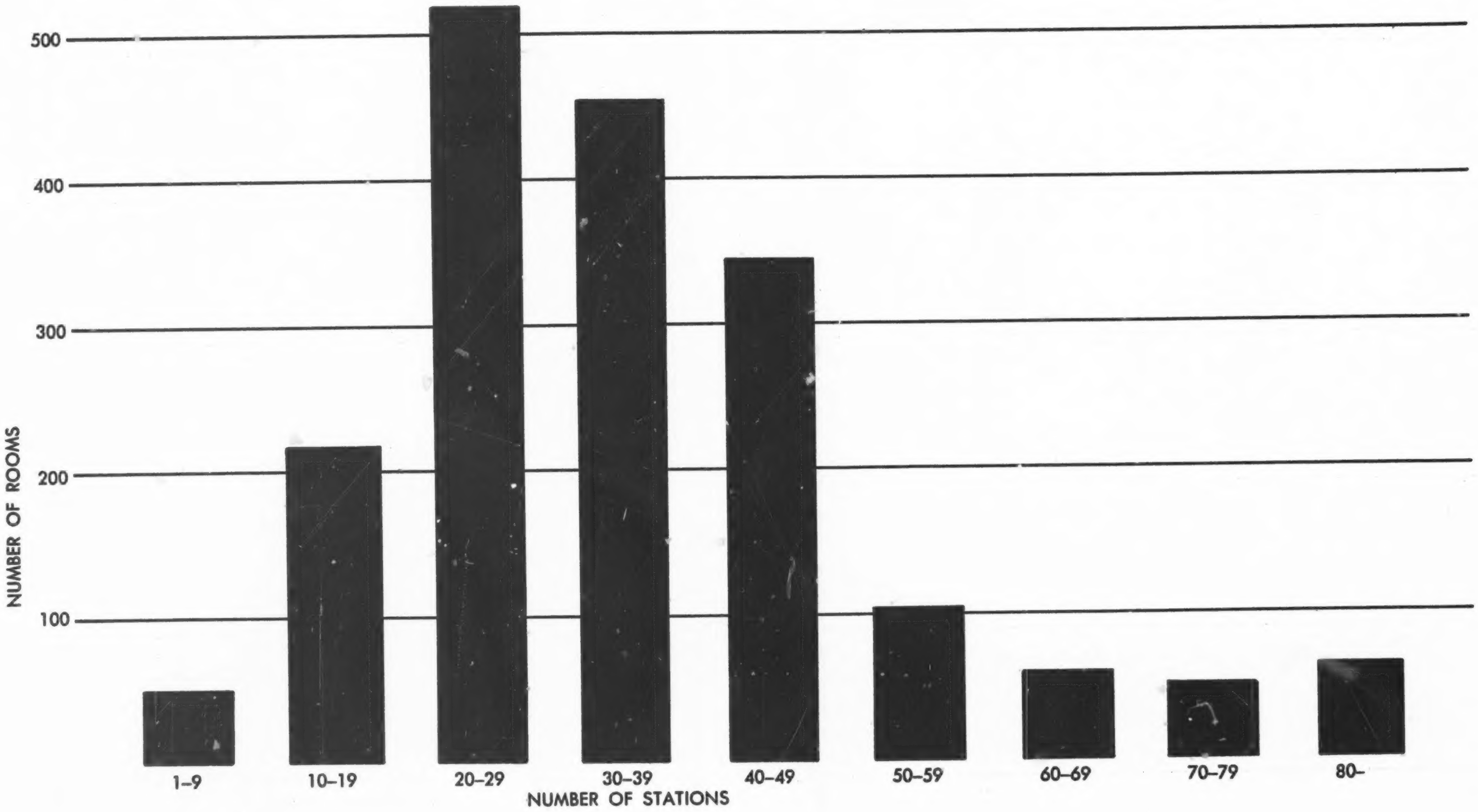


Figure 11

DISTRIBUTION OF CLASSROOM SIZES ACCORDING TO NUMBER OF STATIONS REPORTED, UNIVERSITY OF CALIFORNIA, FALL 1963

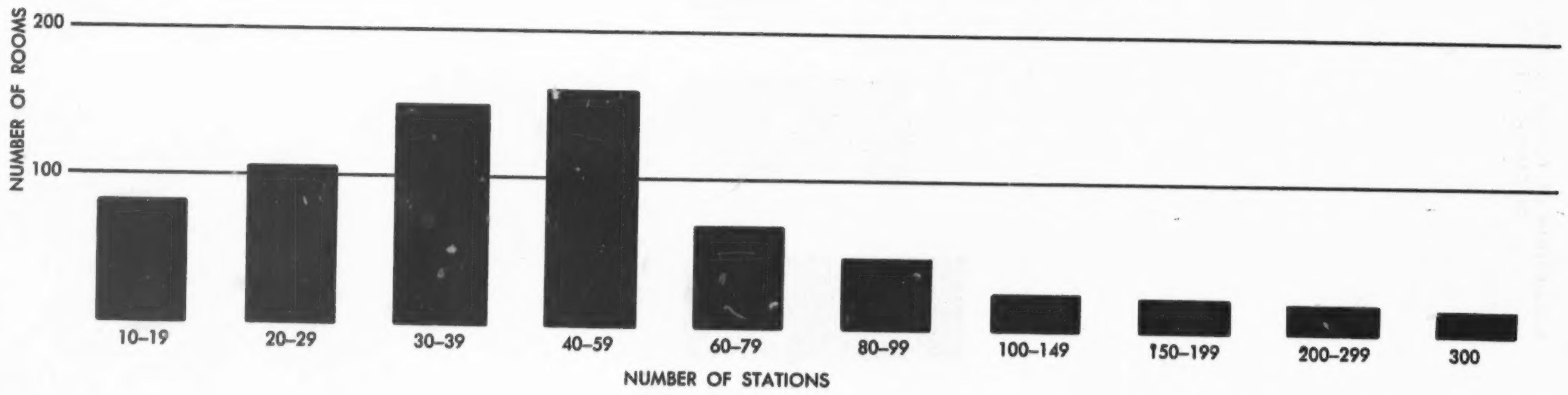


Figure 12

DISTRIBUTION OF JUNIOR COLLEGE CAMPUSES BY SIZE OF CAMPUS (FTE), FALL 1963

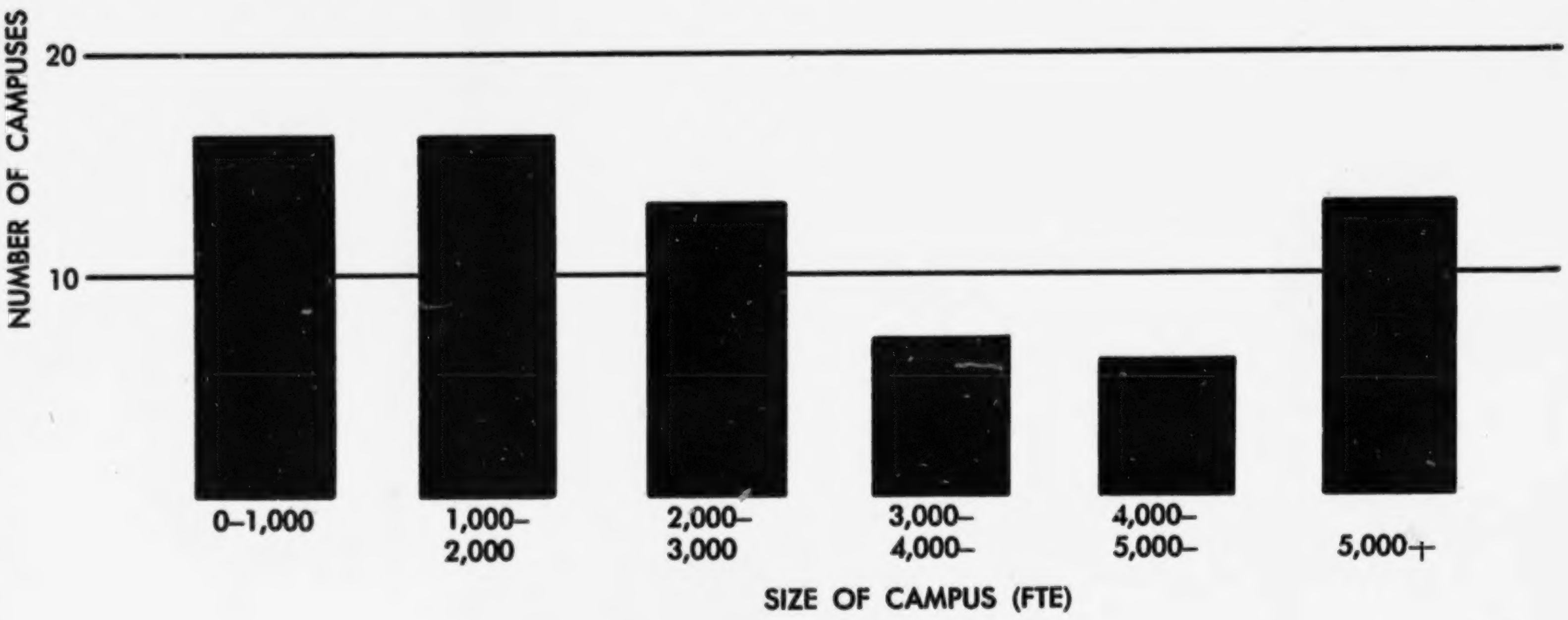


Figure 13

DISTRIBUTION OF STATE COLLEGE CAMPUSES
BY SIZE OF CAMPUS (FTE), FALL 1963

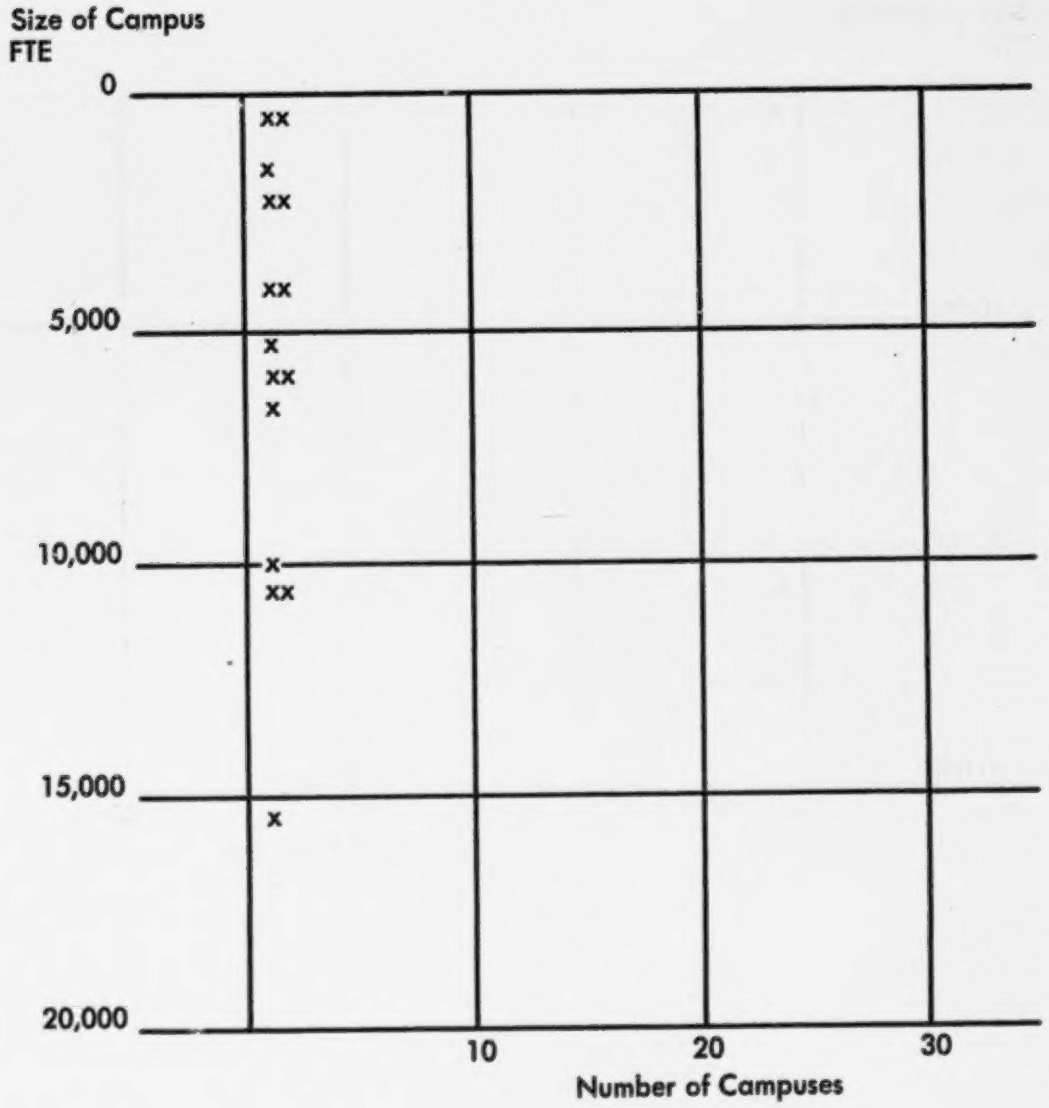


Figure 14

DISTRIBUTION OF UNIVERSITY OF CALIFORNIA CAMPUSES
BY SIZE OF CAMPUS (FTE), FALL 1963

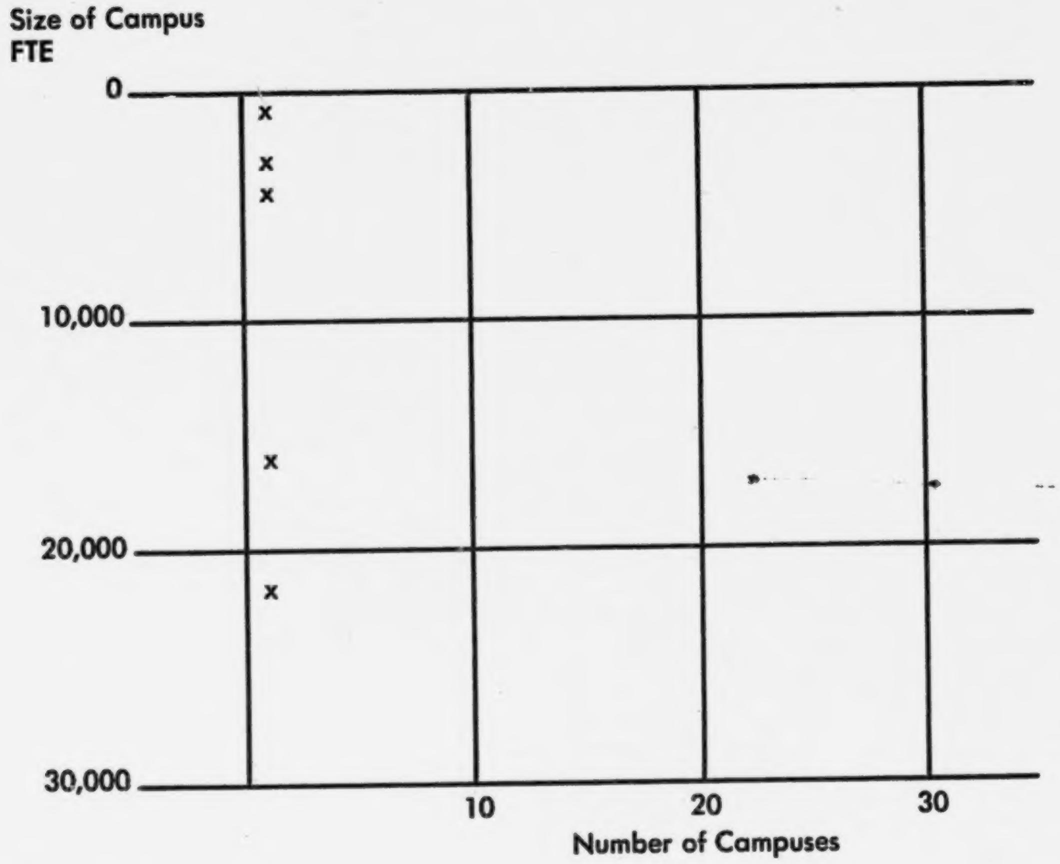


TABLE I

Summary of Floor Areas and Scheduled Utilization of Instructional Rooms
California's Public Institutions of Higher Education
All Facilities Reported—Fall 1963

Institutions	Type of room	Scheduled rooms			Assignable square feet per scheduled station	Scheduled class utilization—weekly basis						ASF per 100 weekly student-hours M–F, 8–5
			Stations			Monday–Friday, 8–5			Monday–Friday, 5–10 and Saturday			
		Number of rooms	Total number	Per room		Room use (hours)	Class size percent of stations	Station use (hours)	Room use (hours)	Class size percent of stations	Station use (hours)	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
California State Colleges	Classroom and Sem.	1,307	53,683	41.1	18.3	25.1	72	18.1	4.3	60	2.6	101
	Classroom Serv.	*	*	*	4.3	*	*	*	*	*	*	24
	LD Class Lab	410	9,508	23.2	50.6	18.6	85	15.8	0.9	78	0.7	320
	All Class Lab†	1,417	29,919	21.1	57.2	15.4	85	13.2	1.2	83	1.0	433
	All C Lab Serv.	*	*	*	34.3	*	*	*	*	*	*	260
University of California	Classroom and Sem.	689	40,647	59.0	13.4	27.1	57	15.4	1.8	28	0.5	87
	Classroom Serv.	*	*	*	0.3	*	*	*	*	*	*	2
	LD Class Lab	199	5,485	27.6	42.6	19.4	79	15.4	2.4	75	1.8	277
	All Class Lab†	534	13,543	25.4	47.5	16.5	73	12.1	1.8	67	1.2	393
	All C Lab Serv.	*	*	*	23.0	*	*	*	*	*	*	190
California Junior Colleges	Classroom and Sem.	2,605	120,493	46.3	17.3	19.8	69	13.6	7.2	68	4.9	127
	Classroom Serv.	*	*	*	0.8	*	*	*	*	*	*	6
	LD Class Lab	2,397	69,575	29.0	49.9	18.9	66	12.4	5.5	75	4.1	402
	Class Lab Serv.	*	*	*	8.6	*	*	*	*	*	*	69

* Service rooms are not scheduled; their floor areas are shown in column 4 as per-station amounts, based on the respective numbers of stations in the scheduled rooms *only*. (Note that, except for the minor effects of rounding, the number of assignable square feet per 100 weekly student-hours in column 11 is exactly the same as the percentage figure representing the relationship of column 4 to column 7, and is here so computed.)

† Lower division, upper division, and graduate class labs combined. (Note that class-lab service rooms generally serve two or more class labs, and thus generally are not classifiable by levels. The total floor area of lower division class-lab facilities per scheduled station, and per 100 weekly student-hours, can be approximated by adding the respective figures in columns 4 and 11, but the approximation may not be accurate if the actual relationship of service room to lab-proper floor areas varies significantly from level to level on a per-station basis.)

Note: Columns 4 and 11 relate the floor area data of the *inventory* to the *utilization* data, and thus include the floor area of any unscheduled instructional rooms (except music practice rooms and studios, and language labs.)

TABLE II

Selected Utilization Standards

	(1) Hours/week		*(2) Percent station occupancy*		*(3) Hours/week/station* *	
Lecture	35	×	.70	=	24.5	Space adequacy guides (State Department of Education)
Laboratory	35	×	.80	=	28.0	
Lecture	30	×	.60	=	18.00	*Master Plan*
Laboratory	20	×	.80	=	16.00	
Lecture	30	×	.75	=	22.5	State colleges (activity rooms, 25 × 0.85) (8 a.m.–5 p.m. basis)
Laboratory	20	×	.85	=	17.0	
Lecture	36	×	.67	=	24.0	University of California *Restudy Standards* (8 a.m.–10 p.m. basis)
Laboratory	24	×	.80	=	19.2	
Lecture	34	×	.66	=	22.4	Proposed utilization components (8 a.m.–5 p.m.)
Laboratory:						
Lower division	25	×	.85	=	21.3	
Upper division	20	×	.80	=	16.0	

---

* Hours/week/station is the product of (1) and (2).

TABLE III

Standard Classroom Layout—Type A
Total Square Feet * (Sq. Ft. per Station in Parentheses)
Pedestal-Mount Tablet-Arm Chairs With Multiple Aisles

1. 10′-0″ from front wall to back of first chair.
2. Chairs spaced from 2′-8″ to 2′-10″ back-to-back, and 3′-0″ centers laterally.
3. 3′-9″ from right wall to center of right chair; 2′-6″ from left wall to center of left chair.
4. Cross aisle if more than 7 chairs long, or if more than 1 door.
5. Chalkboards on front and right walls.

Width of room	Number of chairs	3	4	5	6	7	8	9	10	11	12
	Feet (Min.)	12¼	15¼	18¼	21¼	24¼	27¼	30¼	33¼	36¼	39¼
Length of room											
Number of chairs	Min. and max. dimension										
1	10′- 6″	129 (42.9)	160 (40.0)	192 (38.3)	223 (37.2)	255 (36.4)	286 (35.8)	318 (35.3)	349 (34.9)	381 (34.6)	412 (34.3)
1	13′- 2″ 13′- 4″	162 (27.1)	202 (25.3)	242 (24.2)	282 (23.5)	321 (23.0)	361 (22.6)	401 (22.3)	441 (22.0)	480 (21.8)	520 (21.7)
3	15′-10″ 16′- 2″	196 (21.8)	244 (20.3)	292 (19.5)	340 (18.9)	388 (18.5)	436 (18.2)	484 (17.9)	532 (17.7)	580 (17.6)	628 (17.4)
4	18′- 6″ 19′- 0″	230 (19.1)	286 (17.9)	342 (17.1)	398 (16.6)	455 (16.2)	511 (16.0)	567 (15.8)	623 (15.6)	680 (15.4)	736 (15.3)
5	21′- 2″ 21′-10″	263 (17.6)	328 (16.4)	392 (15.7)	457 (15.2)	521 (14.9)	586 (14.6)	650 (14.5)	715 (14.3)	779 (14.2)	844 (14.1)
6	23′-10″ 24′- 8″	297 (16.5)	370 (15.4)	443 (14.8)	515 (14.3)	588 (14.0)	661 (13.8)	734 (13.6)	806 (13.4)	879 (13.3)	952 (13.2)
7	26′- 6″ 27′- 6″	331 (15.8)	412 (14.7)	493 (14.1)	574 (13.7)	655 (13.4)	736 (13.1)	817 (13.0)	898 (12.8)	979 (12.7)	1,060 (12.6)
8†	32′- 2″ 33′- 4″	401 (16.7)	499 (15.6)	598 (14.9)	696 (14.5)	794 (14.2)	892 (13.9)	991 (13.8)	1,089 (13.6)	1,187 (13.5)	1,285 (13.4)
9†	34′-10″ 36′- 2″	435 (16.1)	541 (15.0)	648 (14.4)	754 (14.0)	861 (13.7)	967 (13.4)	1,074 (13.3)	1,180 (13.1)	1,287 (12.9)	1,393 (12.9)
10†	37′- 6″ 39′- 0″	469 (15.6)	583 (14.6)	698 (14.0)	813 (13.5)	928 (13.3)	1,042 (13.0)	1,157 (12.9)	1,272 (12.7)	1,387 (12.6)	1,501 (12.5)
11†	40′- 2″ 41′-10″	502 (15.2)	625 (14.2)	748 (13.6)	871 (13.2)	994 (12.9)	1,117 (12.7)	1,240 (12.5)	1,363 (12.4)	1,486 (12.3)	1,609 (12.2)
12†	42′-10″ 44′- 8″	536 (14.9)	667 (13.9)	798 (13.3)	930 (12.9)	1,061 (12.6)	1,192 (12.4)	1,323 (12.3)	1,455 (12.1)	1,536 (12.0)	1,717 (11.9)

* Based on midpoint of listed range length.
† Dimensions allow for cross aisle.

TABLE IV

Standard Classroom Layout—Type B
Total Square Feet (Sq. Ft. per Station in Parentheses)
Conventional Arrangement of Tablet-Arm Chairs in Solid Rows

1. 10′-0″ from front wall to backs of chairs in first row.
2. Chairs spaced 3′-0″ back-to-back and on 2′-0″ centers laterally.
3. a) Less than 7 chairs wide: 6′-0″ total aisle, measured from center of chair.
   b) 7 or more chairs wide: 8′-0″ total aisle, measured from center of chair.
4. Chalkboards on front and right walls.

Width of room	Number of chairs	5	6	7	8	9	10	11	12	13	14
	Feet (min.)	14	16	18	22	24	26	28	30	32	34
Length of room											
Number of chairs	Feet* (± 0′-6″)										
4	22	308 (15.4)	352 (14.7)	396 (14.1)	484 (15.1)	528 (14.7)	572 (14.3)	616 (14.0)	660 (13.8)	704 (13.5)	748 (13.4)
5	25	350 (14.0)	400 (13.3)	450 (12.9)	550 (13.8)	600 (13.3)	650 (13.0)	700 (12.7)	750 (12.5)	800 (12.3)	850 (12.1)
6	28	392 (13.1)	448 (12.4)	504 (12.0)	616 (12.8)	672 (12.4)	728 (12.1)	784 (11.9)	840 (11.7)	896 (11.5)	952 (11.3)
7	31	434 (12.4)	496 (11.8)	558 (11.4)	682 (12.2)	744 (11.8)	806 (11.5)	868 (11.3)	930 (11.1)	992 (10.9)	1,054 (10.8)
8	34	476 (11.9)	544 (11.3)	612 (10.9)	748 (11.7)	816 (11.3)	884 (11.1)	952 (10.8)	1,020 (10.6)	1,088 (10.5)	1,156 (10.3)
9	37†	518 (11.5)	592 (11.0)	666 (10.6)	814 (11.3)	888 (11.0)	962 (10.7)	1,036 (10.5)	1,110 (10.3)	1,184 (10.1)	1,258 (10.0)
10	40†	560 (11.2)	640 (10.7)	720 (10.3)	880 (11.0)	960 (10.7)	1,040 (10.4)	1,120 (10.2)	1,200 (10.0)	1,280 (9.8)	1,360 (9.7)
11	43†	602 (10.9)	688 (10.4)	774 (10.1)	946 (10.8)	1,032 (10.4)	1,118 (10.2)	1,204 (10.0)	1,290 (9.8)	1,376 (9.6)	1,462 (9.5)
12	46†	644 (10.7)	736 (10.2)	828 (9.9)	1,012 (10.5)	1,104 (10.2)	1,196 (10.0)	1,288 (9.8)	1,380 (9.6)	1,472 (9.4)	1,564 (9.3)
13	49†	686 (10.6)	784 (10.1)	882 (9.7)	1,078 (10.4)	1,176 (10.1)	1,274 (9.8)	1,372 (9.6)	1,470 (9.4)	1,568 (9.3)	1,666 (9.2)
14	52†	728 (10.4)	832 (9.9)	936 (9.6)	1,144 (10.2)	1,248 (9.9)	1,352 (9.7)	1,456 (9.5)	1,560 (9.3)	1,664 (9.1)	1,768 (9.0)

* Deduct 2′-6″ (for absence of aisle across center or rear) if not more than 7 chairs wide or if only one door.
† The floor behind the eighth row should slope, i.e., step, upward.

TABLE V

Work Sheet
Ranges of Assignable Square Feet Per Station (ASF/STN) by Subject Field Area, Public Segments of Higher Education, Fall, 1963[a]

Subject field area	Suggested changes ASF/STN	Restudy standard ASF/STN	Junior Colleges		California State Colleges		University Campuses Range
			Range	Median	Range	Median	
Life sciences							
Agriculture[b]							
Lower division	--	60	80–224	147	78–208	93	59[d]
Upper division	--	100	--	--	38–40	39[d]	32–54
All laboratories	--	--	--	--	38–208	108	39–213[d]
Biological sciences							
Lower division	--	40	26–60	43	40–128	50	31–48
Upper division	--	60	--	--	36–103	55	42–47
All laboratories	--	--	--	--	36–1,030	62	51–65
MPE sciences							
Physical sciences							
Lower division	--	50	23–60	40	40–140	61	40–43
Upper division	--	80	--	--	51–332	109	44–56
All laboratories	--	--	--	--	39–832	85	59–72
Mathematical sciences							
Lower division	--	--	16–30	25	--	--	--
Upper division	--	--	--	--	--	--	36[d]
All laboratories	--	--	--	--	--	--	39[d]
Engineering sciences[b]							
Lower division	--	100	--[c]	--	45–377	85	43–193
Upper division	--	150	--	--	73–128	93	102–135
All laboratories	--	--	--	--	45–377	102	99–219
Social sciences							
Psychology							
Lower division	--	--	--	--	36–50	43	23–42
Upper division	--	--	--	--	39–147	49	25–29
All laboratories	--	--	--	--	36–489	49	34–98
All other social sciences							
Lower division	--	30	--	--	--	--	29–46
Upper division	--	40	--	--	--	--	23–87
All laboratories	--	--	--	--	--	--	27–73
Humanities							
Arts							
Lower division	--	40	--	--	--	--	29–45
Upper division	--	60	--	--	--	--	31–63
All laboratories	--	--	--	--	--	--	50–76
Professions (U.C. & C.S.C.)[g]							
Business administration							
Lower division	--	--	--[c]	--	32–44	35	--
Upper division	--	--	--	--	30–97	34	--
All laboratories	--	--	--	--	30–97	35	30[f]
Education							
Lower division	--	--	--	--	--	--	--
Upper division	--	--	--	--	--	--	--
All laboratories	--	--	--	--	30–258	52	21–72
Home economics							
Lower division	--	--	--	--	58–430	56	--
Upper division	--	--	--	--	39–78	52	--
All laboratories	--	--	--	--	39–130	60	88–111
Journalism							
Lower division	--	--	--	--	46–204	91	--
Upper division	--	--	--	--	55–116	85[d]	--
All laboratories	--	--	--	--	46–914	115	40–213
Health scences							
Lower division	--	--	--	--	49–109	79[d]	--
Upper division	--	--	--	--	60–69	65[d]	--
All laboratories	--	--	--	--	49–108	73	88–101
Junior college classifications[h]							
Agriculture	--	--	80–224	145			
Business	--	--	22–56	40			
Home economics	--	--	24–94	50			
Applied graphic arts	--	--	22–129	50			
Health services	--	--	21–72	40			
Public personnel service	--	--	24–76	50			
Aeronautical technology	--	--	76–210	155			

TABLE V—Continued

Subject field area	Suggested changes ASF/STN	Restudy standard ASF/STN	Junior Colleges		California State Colleges		University Campuses Range
			Range	Median	Range	Median	
Junior college classifications [h] —continued							
Air conditioning	--	--	69–183	130			
Building trades	--	--	84–200	40			
Ceramic technology	--	--	28–50	40			
Chemistry technology	--	--	--	70 [d]			
Drafting technology	--	--	28–82	45			
Electrical technology	--	--	47–100	70			
Electromechanical	--	--	--	40 [d]			
Electronic technology	--	--	32–126	60			
Engineering, general	--	--	26–89	55			
Engineering technology	--	--	60–70	65			
Industrial technology	--	--	55–99	75			
Mechanical	--	--	91–250	150			
Metallurgical technology	--	--	31–83	55			
Metal trades	--	--	104–164	130			
Textile technology	--	--	121–162	140			
Welding	--	--	67–125	90			

[a] ASF/STN includes laboratories and lab service area per laboratory station.
[b] For university and state colleges.
[c] See junior college classifications.
[d] This figure represents only one cr two laboratories.
[e] The ranges given for the junior colleges and the state colleges represent the spread from the highs and lows of all laboratories reported in the given subject field area. Ranges for the university are ranges of averages among campuses.
[f] Average ASF/STN at Berkeley only.
[g] *Restudy* Standard for Miscellaneous Profession was 40 ASF/STN for both lower division and upper division.
[h] Medians for junior colleges were rounded to nearest multiple of five.

TABLE VI

Analysis of Office Space in All Facilities By Station, FTE Teaching Staff and FTE Instructional Staff California State Colleges[1]—Fall 1963

Type of room	Assignable square feet	Number of stations	ASF per station	FTE teaching staff	ASF per FTE teaching staff	FTE instructional staff	ASF per instructional staff
All office space (300)[2]	1,345,283	----	----	----	----	5,817.1	231.3
Academic office (301)	630,218	6,511	96.8	4,129.3	152.6	----	----
Academic office plus other office, 301 + 302	1,039,808	9,903	105.0	----	----	5,817.1	178.8

[1] Includes data for colleges at Hayward, California Polytehnic (KV), California Polytechnic (SLO), Chico, Fresno, Humboldt, Long Beach, Los Angeles, Fullerton, Sacramento, San Diego, San Fernando Valley, San Francisco, and San Jose.
[2] The computer code number used for identification of room types. All office space includes conference rooms (304) and office service space (303) in addition to academic office and other space.
Sources: Inventory of Non-Residential Physical Facilities by Type Room, California State Colleges, Fall 1963, 1963 California Public Higher Education Cost and Statistical Analysis.

TABLE VII

Analysis of Office Space in All Facilties By Station, FTE Teaching Staff and FTE Instructional Staff University of California[1]—Fall 1963

Type of room	Assignable square feet	Number of stations	ASF per station	FTE teaching staff	ASF per FTE teaching staff	FTE instructional staff	ASF per instructional staff
All office space (300)[2]	1,806,432	----	----	----	----	4,592.69	393.3
Academic office (301)	789,173	7,751	102.0	2,744.84	288.0	----	----
Academic office plus other office (301 + 302)	1,573,999	14,668	107.3	----	----	4,592.69	343.0

[1] General campuses, fall 1963: Berkeley, Davis, Los Angeles, Riverside and Santa Barbara.
[2] The computer code number used for identification of room types. All office space includes conference rooms (304) and office service space (303) in addition to academic office and other office space.
Sources: University of California, Fall 1963 space survey summary tables all campuses (excluding medical centers). 1963 California Public Higher Education Cost and Statistical Analysis, CCHE.

TABLE VIII

Recommended Standard Instructional Floor Areas Per Full-Time Equivalent Student for Classrooms, Teaching Laboratories, and Graduate-Student Research Laboratories in State Colleges and the University of California

(Table 33, Restudy)

General subject field	Level of instruction	Classroom	Net square feet per total FTE student in the level of the subject field		
			Teaching laboratories		Research laboratories
		S.C. & U.C.	S.C.	U.C.	U.C. only
1	2	3	4	5	6
Agriculture	Lower division	7.1	41	41	--
	Upper division	7.2	63	63	--
	Graduate	1.7	100	--[a]	200
Arts	Lower division	6.5	36	36	--
	Upper division	6.2	53	53	--
	Graduate	5.3	60	--	140
Engineering	Lower division	5.4	95	95	--
	Upper division	7.5	96	96	--
	Graduate	2.3	--	--[a]	200
Languages and literature	Lower division	11.9	--[b]	--[b]	--
	Upper division	9.5	--[b]	--[b]	--
	Graduate	9.5	--[b]	--[a]	30
Mathematics	Lower division	9.6	--[b]	--[b]	--
	Upper division	9.5	--[b]	--[b]	--
	Graduate	9.5	15[c]	--[a]	30
Miscellaneous professions[d]	Lower division	8.7	31	31	--
	Upper division	8.9	2	30*	--
	Graduate	8.0	30	--*	30
Biological sciences	Lower division	6.6	30	30	--
	Upper division	7.2	38	38	--
	Graduate	1.8	60	--[a]	160
Physical sciences	Lower division	8.0	28	28	--
	Upper division	8.0	42	42	--
	Graduate	1.8	80	--[a]	160
Social sciences	Lower division	9.5	3	3	--
	Upper division	9.2	2	2	--
	Graduate	8.4	15	--[a]	30

---

[a] Allowance included under research laboratory.
[b] Allowance included in classroom area.
[c] To be included with classroom area.
[d] Education, journalism, law, librarianship, social welfare.
* Revisions made by University of California since publication of report.

Note: The number of FTE students in a given subject field and level of instruction, to which these unit areas are to be applied, is that which represents the *total* full-time equivalence of all courses at that level in that subject field, irrespective of the students' majors and levels of registration in the institution.

(This table is based on Table 33, 345, of *A Study of the Needs of California in Higher Education*) (Sacramento: State Department of Education, 1955).

TABLE IX

Recommended Standard Staff Floor Areas for Instructional Departments in State Colleges and University of California

(Table 34, Restudy)

General subject field	State colleges—offices (Net square feet)			University of California—offices (Net square feet)		Departmental shops,[b] storage and miscellaneous (Percent)	
	Academic	Administrative[c]	Research laboratories[a]	Academic	Administrative[c]	State colleges	University of California
1	2	3	4	5	6	7	8
Agriculture	110	40	300	140	60	6	10
Arts	110	25	100	140	30	6	10
Engineering	110	40	300	160	60	9	15
Languages and literature	110	25	40	130	30	3	5
Mathematics	110	25	60	130	30	3	5
Miscellaneous professions[d]	110	50	80	160	80	6	10
Biological science	110	35	250	120	50	6	10
Physical sciences	110	35	250	120	50	6	10
Social sciences	110	25	40	130	30	3	5

[a] Including research-laboratory service rooms (including animal quarters in regular academic buildings), libraries and other collections within the instructional department, and academic conference rooms.

[b] Manufacturing and maintenance shops within the instructional department. (Instructional shops are classified as teaching laboratories and included in Table 33.)

[c] Including administrative conference rooms.

[d] Education, journalism, law, librarianship, social welfare.

Note: Columns 2–6: Net square feet per full-time equivalent faculty member (and equivalent ranks) and teaching assistant.

Columns 7 and 8: Percentage of total instructional and staff space, to be added to the sum of the areas obtained from Table 33 and columns 2–6 above. (Does not include buildings and grounds maintenance shops and storage.)

(This table is based on Table 34, p. 348, of *A Restudy of the Needs of California in Higher Education*, (Sacramento: State Department of Education, 1955.)

APPENDIX B

Standards for Offices, University of California and California state colleges.

Trade and Technical Instruction and Library Reading Station Allowances.

Standard Abbreviations, and Coding for Standard Classification of Net Floor Areas.

Standard Abbreviations and Definitions of Specific Types of Instructional Rooms.

STANDARDS FOR OFFICES

1. UNIVERSITY OF CALIFORNIA [1]

As an aid in the estimating of space requirements for administrative staff activities, the following items are pertinent.

Item 1—Floorspace required for each of the classifications of clerical employees:

Classification	*Assignable square feet*
Secretary	100
Secretary-stenographer, typist-clerk, general assistance	80
Statistical clerk, senior typist-clerk	90
Reception—1 station and several persons capacity	150
Special files rooms	150

If two or more employees share a room or area, the area allocated to each may be reduced.

Item 2—Private offices: For private offices, if the furniture covers less than 25 square feet, the office size should be from 80 to 100 ASF; if the furniture covers from 25 to 35 square feet, the office size should be from 100 to 120 ASF; more than 35 square feet, the office size should be from 120 to 140 ASF. For department heads with a four- to eight-station work-conference table, the office size should be from 160 to 180 ASF.

Item 3—Floorspace needed for equipment: A guide for floorspace required for each of the common pieces of office furniture is as follows: 30- x 60-inch desk or table occupies 12½ square feet; file cabinet, desk chair or book case occupies 3 square feet; side chair occupies 2 square feet; wardrobe and storage cabinet, 4½ square feet.

Our office has used these standards for administration buildings on the several campuses and actual practice proves that they provide adequate space for the various functions.

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[1] University of California, office of vice president, *Physical Planning and Construction*, April 13, 1966.

Policy on One-man Office Space Standards [1]

1. One-man offices, exclusive of departmental chairmen's and deans' offices, ranging in size from 110 to 150 square feet, will be programmed for new buildings.

   a. The average size of a one-man office programmed for a new building should approximate 130 square feet. (Plus or minus variation in this average is expected and is dependent on the factors listed under 1.b.)

   b. Factors which affect office size include but are not limited to the following:

      (1) Office space requirements of different academic disciplines;

      (2) Laboratory space available to an individual in addition to his office space; and

      (3) The floorspace (in square feet) required for furniture.

2. Departmental chairmen's personal offices will be programmed for new buildings at 160 assignable square feet or less.

3. Deans' personal offices will be programmed for new buildings at 180 assignable square feet or less.

4. Provision of larger offices than indicated in the foregoing will be subject to written justification, approved by the offices of the appropriate chief campus officer and the vice president—business.

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[1] Office of the president, November 20, 1962.

2. CALIFORNIA STATE COLLEGES [2]

The formula for determining the number of faculty office stations needed is as follows: The projected regular student FTE plus the projected limited student FTE all divided by the projected student-faculty ratio for the past five years produces the total faculty office stations required.

The projected limited student FTE in the numerator is obtained by applying the projected percentage which limited student FTE is of the regular student FTE over the past five years.

In formula form:

(projected regular FTE + projected limited FTE) ÷ projected student-faculty ratio = gross office stations entitlement — existing office stations = net office station entitlement.

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[2] College Facility Planning Office, January 11, 1963.

Definitions

Projected regular FTE

This is the amount of regular FTE projected for the last year of the current five-year building program as issued and approved by the Trustees of the California State Colleges.

Projected student-faculty ratio

This is the result of projecting the past five-year trend of student-faculty ratios into the future through the last year of the current five-year building program.

Projected limited student FTE

This is the result of projecting the past five-year trend of the percentages which the limited student FTE is of the regular student FTE into the future through the last year of the current five-year building program.

Gross office stations entitlement

This is the total number of faculty office stations which the college will need by the last year of the current five-year building program.

Existing office stations

This is the number of faculty office stations actually existing in the buildings of the college, including those buildings currently under construction.

Net office stations entitlement

This is the total number of faculty office stations to which the college is entitled over and above those which actually exist. This is the additional number of faculty office stations that it will be necessary to provide by the last year of the current five-year building program.

Faculty and Administrative Offices—Space Standards[1]

	Square feet
President	300
Deans	200
Associate deans and divison chairman	180
Department heads, librarians and coordinators	150
1-man offices	110
2-man offices	160
3-man offices	250
Group offices (per man)	80
Secretary-receptionist	160
2 girls	160
3 girls	230
4 girls	300
Student assistants (each)	60
Fileroom (with workspace) $\frac{2}{3} \times$ linear feet of files $\times 10 =$ area, or 10 square feet per file	
Fileroom (without workspace) $\frac{2}{3} \times$ linear feet of files $\times 6 =$ area, or 6 square feet per file	

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[1] January 11, 1963.

TRADE AND TECHNICAL INSTRUCTION AND LIBRARY READING STATION ALLOWANCES

TRADE AND TECHNICAL CLASSIFICATION

(Based upon *Standard Classification of Subject Fields and Services* used in the California Public Higher Education Cost and Statistical Analysis, CCHE, 1965)

Code	*Subject field*
6800	Trade and technical (general)
6801	Aeronautics technology
6802	Airconditioning
6803	Building trades
6804	Ceramic technology
6805	Chemical technology
6806	Culinary
6807	Drafting technology
6808	Electrical technology
6809	Electromechanical
6810	Electronics technology
6811	Engineering general
6812	Engineering technology
6813	Industrial management and supervision
6814	Industrial technology
6815	Mechanical
6816	Metallurgical technology
6817	Metal trades
6818	Textile technology

READING STATION ALLOWANCES BASED UPON FALL 1963 STUDENT CREDIT HOUR REPORTS

1. Trade-technical student credit hours (SCH) less than 3 percent of total SCH: 20 percent

Chabot
Grossmont
Merced
Palos Verde
Siskiyous

2. Trade-technical SCH 3 percent and 4 percent of total SCH: 19 percent

Foothill
Gavilan
Imperial
Marin
Oceanside
San Francisco
Santa Ana
Santa Rosa
Sierra
Yuba

3. Trade-technical SCH 5 percent and 6 percent of total SCH: 18 percent

American River
Antelope Valley
Bakersfield
Barstow
Cabrillo
Cerritos
Chaffey
East Los Angeles
Los Angeles City
Los Angeles Metro
Los Angeles Valley
Modesto
Mt. San Jacinto
Napa
Palomar
Porterville
Rio Hondo
Riverside
Sacramento
Santa Barbara
Sequoias
Shasta
Victor Valley

4. Trade-technical SCH 7 percent and 8 percent of total SCH: 17 percent

Coalinga
Diablo Valley
El Camino
Fullerton
Hancock
Los Angeles Harbor
Los Angeles Pierce
Monterey
Pasadena

5. Trade-technical SCH 9 percent and 10 percent of total SCH: 16 percent

Compton
Desert
Glendale
Lassen
Mt. San Antonio
San Bernardino
San Joaquin
San Mateo
Santa Monica
Southwestern
Taft
Ventura

6. Trade-technical SCH equal to or more than 11 percent of total SCH: 15 percent

Citrus
Contra Costa
Fresno
Hartnell
Long Beach
Los Angeles Trade
Oakland
Orange
Reedley
San Diego
San Jose
Vallejo

STANDARD ABBREVIATIONS AND CODING FOR STANDARD CLASSIFICATION OF NET FLOOR AREAS *

Note: The general types of rooms (boldface below) are to be used as broad categories in which the tabulated data are organized and analyzed. Entries in column 2 of Form P-1 are to be made in terms of the specific types of rooms. Use the three-digit code number to the left of the room for column 2.

Each of these specific types of rooms is defined on succeeding pages.

100. Instruction

101. Classroom
102. Classroom Serv
103. Seminar
104. T Lab—Low Div
105. T Lab—Up Div
106. T Lab—Grad
107. T Lab—Serv
108. Music Prac
109. Music Stud
110. Lang Lab

200. Lab Research

201. Research—Lab
202. Animal Qtr
203. Greenhouse

300. Office

301. Acad Office
302. Oth—Office
303. Office—Serv
304. Conference

400. Lib & Museum

401. Study Hall
402. Carrel
403. Open Stack
404. Stack
405. Lib Serv
406. Museum

500. General Use

501. Aud
502. Gym
503. Armory
504. Chapel

600. General Serv

601. Food Serv
602. Health Serv
603. Lounge
604. Merch Serv
605. Locker
606. Aud-Vis—Gen
607. Aud-Vis—TV
608. Parking

700. Other Nonres

701. Shop
702. Storage
703. Field Bldg.
704. Misc
705. Inactive
706. Alteration

800. Hospital

900. Resident Fac

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* From Instructions for Forms P-1 and P-2, CCHE Cost and Statistical Study, 1963.

TYPES OF ROOMS—STANDARD ABBREVIATIONS AND DEFINITIONS OF SPECIFIC TYPES INSTRUCTIONAL ROOMS

100. Instructional Rooms

101. Classroom. Classroom—as typically but not necessarily equipped with tablet-arm chairs, including lecture halls and lecture-demonstration rooms, but excluding seminar rooms and laboratories.

Stations to be reported on P-1 form *in column 6: student*-stations only. If extra chairs have been placed in a lecture hall or other classroom equipped with fixed seats, include only so many of the extra chairs as could have been replaced by fixed seats without overcrowding the room.

102. Classroom Serv. Classroom service—auxiliary facilities for classrooms, including projection rooms, preparation rooms, closets, etc.

Stations to be reported: None.

103. Seminar. Seminar room—as typically and usually equipped with a large table and chairs, or the equivalent, *and* ordinarily but not necessarily exclusively used for organized classes. (See also 304—Conference).

Stations to be reported on P-1 form *in column 6: student*-stations only. Be certain that the reported figure represents the number of students that can be scheduled in the room *at one time.*

104. T Lab, Low Div. Teaching laboratory—any special-purpose room for organized classes in a specific subject field, including art, radio-TV, drafting, music, statistics, etc., but excluding physical education and the military sciences (see 502—Gym and 503—Armory). (See also 108—Music Prac and 109—Music Stud).

Stations to be reported on P-1 form *in column 6: student*-stations only. Be certain that the reported figure represents the number of students that can be scheduled in the room at one time.

105. T Lab, Up Div. Same as 104—T Lab, Low Div except use for upper division classes.

106. T Lab, Grad. Same as 104—T Lab, Low Div except use for graduate classes.

107. T Lab Serv. Teaching-lab service room—auxiliary facilities for teaching labs, e.g., supply- and equipment-issue rooms, balance rooms, preparation rooms, etc., but *excluding* such facilities for physical education and the military sciences (see 502—Gym and 503—Armory).

Stations to be reported on P-1 form: *none.*

Note: Except for offices and other rooms which can appropriately be classified as types numbered beyond 300 in this list, all rooms which serve *functionally* as teaching labs in such home economics department facilities as those commonly referred to as home-management labs or demonstration homes, and in such education department facilities as those commonly referred to as demonstration laboratory schools, should be classified as T Lab Serv. By being so classified, such areas will be included in tabulations of the total floor areas serving teaching-laboratory purposes (i.e., T Lab *plus* = T Lab Serv), but will be excluded from the calculation of average room- and station-utilization rates in terms of scheduled class-hours and student-hours (classrooms, seminar rooms, and teaching labs only)—the exclusion of such facilities as demonstration homes and demonstration schools from the class-schedule analyses being made on the basis that the utilization of such rooms is very inadeqately measured by a tabulation of organized-class data.

108. Music Prac. Music-practice room—a small room used for musical practice by individual students or very small groups, and typically with a floor area of less than 100 square feet. (See also 109—Music Stud).

Stations to be reported on P-1 form: *none.*

Note: A large room used for instruction of, and practice by, a group such as a band, orchestra, ensemble, or chorus is classified as a T Lab.

109. Music Stud. A room used for the musical instruction of individual students, unless the major portion of the room serves as the instructor's office, in which case the room is classified as an academic office (see 301—Acad Office).

Stations to be reported on P-1 form: *none* (unless, of course, the ''music studio'' is not classified as Music Stud).

110. Lang Lab. Language Laboratory—special purpose facilities used for student instruction and/or practice in language arts and typically containing semisoundproof booths or stations with audio equipment, including supporting specialized equipment and control rooms.

Stations to be reported: student stations only.

Note: Related facilities, such as equipment repair and service shops, storage, administrative offices, etc., which are appropriately classifiable under other type-of-room categories, should be so classified and reported.

200. Laboratory-Research Facilities

(*Note:* This general category is not intended to encompass all facilities serving the function of research, but simply to include the scientific-laboratory areas generally characterized by the presence of laboratory equipment and such utility-services as water, gas, electricity, steam, compressed air, vacuum, and/or the like.)

201. Resrch Lab. Research laboratory—any special-purpose research facility, including those used by graduate students and advanced undergraduates for individual research, and including such rooms which consist *in part* of office facilities. Includes related service rooms, e.g., darkrooms, controlled environment storage areas, sterilizer rooms, supply and equipment-issue rooms, etc.

Stations to be reported on P-1 form *in column 6: staff*-stations in terms of the number of faculty members and/or equivalent nonfaculty professional research staff that the room presently accommodates (or normally would accommodate in the case of a room which is significantly underutilized).

202. Animal Qtr. Animal quarters—rooms used for the housing and feeding of animals *in regular academic buildings only.* (See also 703—Field Bldg.)

Stations to be reported: *none.*

203. Greenhouse. Greenhouse — includes headhouse or other directly-related auxiliary facilities (unless such space has been converted and equipped to serve as, for example, a research lab or office in the sense defined as Research Lab, Acad Office, or Other Office, in which case the space should be so classified).

Stations to be reported on P-1: *none* (unless, of course, the "greenhouse" is not classified as Greenhouse).

300. Office Facilities

301. Acad Office. Academic office—faculty studies, including combination office-seminar rooms, and including teaching assistants' and other graduate students' office-type facilities. Generally includes all officies of instructional departments and research organizations, *except* the office space of the chairman (or director) and his administrative and other nonacademic staff. Rooms which *functionally* are research labs but *physically* are of the nature of offices are classified as Acad Office. (See also 201—Resrch Lab and 302—Other Office.)

Stations to be reported on P-1 form *in column 6: staff* stations in terms of the number of faculty members and/or equivalent nonfaculty professional research staff that the room presently accommodates (or normally would accommodate in the case of a room which is significantly underutilized).

Note: Except in the case of office-type facilities for graduate students, either as students or as teaching assistants, most offices housing secretaries, typists, clerks, and other nonprofessional staff members are more properly classifiable as Other Office: but such offices should be classified as Acad Office if the nonprofessional staff members are serving directly as assistants to a faculty member, either in his teaching function or in his research function. (See also the note under 201—Research Lab.)

302. Other Office. Other office—all offices other than those defined above as Acad Office, i.e., the offices of all administrative and other nonacademic agencies, including the administrative offices of instructional departments and research organizations.

Stations to be reported on P-1 form *in column 6:* staff stations in terms of the total number of all types of personnel that can be accommodated at one time—excluding, of course, visitors.

Note: Ordinarily, the one office of the chairman of an instructional department, or of the director of a research organization, is classified as Other Office. If that person is so unusually fortunate as to have also another office as a study, that other office should be classified as Acad Office.

303. Office Serv. Office service—file rooms, office-supply-storage rooms, vaults, machine-records room, mimeograph rooms, mail-handling rooms, telephone exchanges, interviewing rooms, waiting rooms, and other auxiliary office facilities, including private toilets and internal corridors within office suites. (See also 304—Conference.)

Stations to be reported on P-1 form: *none.*

304. Conference. Conference room—as typically and usually equipped with a large table and chairs, or the equivalent, but ordinarily not used for organized classes. (See also 103—Seminar.)

Stations to be reported on P-1 form *in column 6:* the total existing number of seats in the room, including chairs not directly at the table if all such chairs constitute a reasonable complement of furniture for the usual uses of the room, as in the common case of conference rooms in which it is not essential that every person attending a conference be seated at the table.

Note: In the case of a conference room that is significantly undersupplied or oversupplied with chairs, i.e., to the point that the room is either seriously overcrowded or could easily accommodate considerably more chairs, the number of stations should be reported in terms of a proper layout of furniture. The point is not to embark on a career of rating "optimum" capacities, but simply to avoid a serious distortion of tabulated data resulting from a condition which could easily be remedied—and may very well *be* remedied on most other days other than the day of the space survey.

400. Libraries and Museums

401. Study Hall. Study halls and library reading rooms, including the floor area occupied by bookshelves mounted in or standing against, the wall. (See also 403—Open Stack and 404—Stack.) Includes typing rooms and other specialized study facilities in libraries. (See also 402—Carrel.)

Stations to be reported on P-1 form *in column 6:* the total number of all types of study stations in the room.

Note: In special facilities for blind or other handicapped persons, the number of stations should be reported in terms of handicapped persons only—excluding, for example, the chair for the blind student's reader.

402. Carrel. Carrel—an individual study station within or adjoining the stacks. Ordinarily no purpose is served by using this category, except for the classification of an entire room which is subdivided into carrels, or for an array of carrels adjoining a stack area. Single carrels (or small groups of carrels) and other individual study stations within the stacks should simply be counted as study capacity, and then reported in column 6 as the number of stations, for the area classified as Stack (see 404).

Stations to be reported on P-1 form *in column 6:* the total number of individual study stations in the area classified as Carrel and reported as a single room.

403. Open Stack. Open-stack reading rooms—as commonly so referred to, but including only such rooms in which there are *ranges* of shelving units (i.e., two or more parallel rows of double-faced shelving units), and excluding reading and reference rooms in which the shelving facilities consist only (or essentially only) of single-faced shelving units standing against (or built into) the walls and/or of single rows of free-standing single- or double-faced units standing against partitions (such excluded reading and reference rooms being classified as Study Hall). (See also 401—Study Hall and 404—Stack).

Stations to be reported on P-1 form *in column 6:* the total number of all types of study stations in the room.

404. Stack. Stack areas—all collections-housing areas in which study facilities (if any) occupy a minor portion of the total floor area. Includes circulation areas within the stacks, including stairways, book lifts, etc. Includes collections-housing facilities for such collections as art objects and anthropological, archaeological, botanical, geological, paleontological, and zoological specimens in racks, trays, or cabinets which are reasonably accessible for study. (See also 401—Study Hall, 403—Open Stack, 406—Museum and 702—Storage).

Stations to be reported on P-1 form *in column 6:* the number of carrels or other individual study stations within the stack area.

Note: Tables, shelves, or other work surfaces for use in the process of "browsing" and selecting reference material are *not* carrels or study stations in the sense here intended, and should *not* be counted.

405. Lib Serv. Library-service areas—circulation desks and related work areas, card catalog areas, acquisitions work areas, microfilm-processing areas, etc.

Stations to be reported on P-1 form: *none.*

Note: Library staff work areas properly classified as Other Office, Conference, Storage, etc., should be so classified and should *not* be reported as Lib Serv.

406. Museum. Museum, art gallery, etc.—exhibition areas, including those for departmental collections, and related work areas. (See also 404—Stack and 702—Storage).

Stations to be reported on P-1 form: *none.*

Note: Reasonably accessible collections-housing facilities, as in sliding racks or trays for anthropological specimens, are to be classified as Stack: relatively inaccessible and/or inactive storage, as in crates and packing cases, is to be classified as Storage; and rooms appropriately classifiable as, for example, Acad Office, Other Office, Conference, and Shop, are to be so classified and reported.

500. General Use

501. Aud. Auditoriums, theaters, and music halls —*only* those designed and equipped for dramatic and/or musical performances, including not only the seating areas (including aisles) and the stage and orchestra pit, but also all related service areas, e.g., checkrooms, ticket sales areas, backstage areas, dressing rooms, projection rooms, "green rooms," etc., but excluding the lobbies (which are to be regarded as part of the building's general circulation area, and are therefore to be excluded from the P-1 form and from all calculations of the building's *net* floor area.

Stations to be reported on the P-1 form *in column 6;* the area bounded by the side and rear walls of the audience seating area, and by the plane of the proscenium arch, should be reported as a separate room (or rooms if there is a balcony); and the audience seating capacity of that area is to be reported as the number of stations. *No* stations are to be reported for any of the other Aud areas, i.e., stage, dressing rooms, etc., even though such areas may be used for organized classes.

Note: Many rooms which are *called* auditoriums are not auditoriums or theaters in the more precise sense here intended. Some "auditoriums," for example, are nothing but king-size lecture halls, Classrooms, and should be so classified—as should all other so-called "auds" which lack the proscenium arch, stage, and related facilities of a theater. However, in the case of a modern music hall with no proscenium arch, with no fixed boundary between the audience seating area and the stage area, and with no extensive backstage or stage wing areas, the entire area (including the stage) should be reported as a single room; and this room should be classified as Aud (as would also be such related areas as the "green room"), the number of stations being reported for that principal room in terms of the normal audience seating capacity (excluding any movable chairs which might be placed on part of the rising platform portion of the stage for special occasions), and *no* stations being reported for any of the auxiliary Aud areas.

502. Gym. Gymnasium—all indoor athletic activity areas, e.g., basketball courts, wrestling rooms, indoor swimming pools, and indoor track and field areas, including not only the spectator seating areas, but also such related service areas as locker rooms, clothing and equipment issue rooms, shower rooms, dressing rooms, and directly related toilet facilities (but not including toilet facilities for the general public).

Stations to be reported on P-1 form: *none.*

It should be noted that all rooms in a gymnasium *building* are *not* necessarily (or even ordinarily) to be classified as Gym. Rooms which fit the definitions of any other categories, e.g., Classroom, Seminar, Acad Office, Other Office, and Storage, are to be so classified and reported.

503. Armory. Armory—indoor drill areas and special purpose instructional rooms for the military sciences, including rifle ranges, arms storage areas, clothing and equipment issue rooms, and other auxiliary or service facilities, but *excluding* instructional rooms classifiable as Classroom or Seminar.

Stations to be reported on P-1 form: *none.*

Note: Rooms which fit the definitions of any other categories, e.g., Classroom, Seminar, Acad Office, Other Office, and Storage (as for *inactive* storage of material), are to be so classified and reported.

504. Chapel. Chapel—areas used for devotional services, including the chancel and such related service areas as choir dressing rooms, organ lofts, and the like.

Stations to be reported on the P-1 form *in column 6:* the seating capacity of the chapel proper.

600. General Service

601. Food Serv. Food service—all feeding facilities (for people, that is), including kitchens, serving areas, refrigerated food storage, meat cutting areas, etc., and including snack bars of which there is significant use at mealtimes (at least lunch), but *excluding* rooms which are used principally for "coffee breaks" (see also 603—Lounge).

Stations to be reported on form P-1 *in column 6:* for the dining areas, the number of persons that can be seated at one time; for all other Food Serv areas, *none.*

602. Health Serv. Health service — all health service facilities for students and/or staff members, including all related rooms.

Stations to be reported on P-1 form: *none.*

603. Lounge. Lounge—principally the lounges and other recreational areas in student unions and faculty clubs, but including lounges in other buildings, and including snackbars or rooms used principally for "coffee breaks" (see also 601—Food Serv).

Stations to be reported on P-1 form: *none.*

Note: In a student union building, rooms which fit the definitions of such categories as Acad Office, Other Office, Conference, Food Serv, Merch Serv, and so on, should be so classified and reported. (And note that the term "lounge" is *not* used in these instructions as a euphemism for public toilets, which are excluded from the next floor area.)

604. Merch Serv. Merchandising services—bookstores, candy and tobacco counters, barbershops, etc.

Stations to be reported on P-1 form: *none.*

Note: Snackbars are here defined as either Food Serv or Lounge. If, however, a snackbar is in the same room with other merchandising facilities, it may be classified as Merch Serv.

605. Locker. Locker rooms — separate locker rooms unrelated to labs, etc.

606. Aud-Vis Gen. Audiovisual—General—special-purpose audiovisual facilities, including preview rooms, rooms used for the preparation or production of audiovisual materials, specialized equipment rooms, etc., but excluding television studio facilities and their supporting specialized equipment and control rooms, which are to be classified separately under Aud-Vis—TV (Audiovisual—television).

Stations to be reported: *none.*

Note: Related facilities, such as equipment-repair and service shops, storage, administrative offices, etc., which are appropriately classifiable under other type-of-room categories, should be so classified and reported.

607. Aud-Vis—TV. Audiovisual — Television — television studio facilities, including supporting specialized equipment and control rooms.

Stations to be reported: *none.*

Note: This category is intended to be used only for facilities the primary purpose of which is to disseminate instructional material and activities. It is *not* to be used for facilities which are part of the instructional laboratories of a department of theater, television, or dramatic arts.

Other facilities required for the production of television programs, such as scenery shops, equipment repair and service shops, storage, administrative offices, etc., which are appropriately classified under other type-of-room categories, should be so classified and reported. (See also 606—Aud-Vis—Gen.)

608. Parking. Parking—any area included within a building or structure used for the parking or storing of motor vehicles or related wheeled or tracked apparatus of any kind, including automobiles, buses, trucks, tractors, farm equipment (self-propelled or towed) etc.

Include as assignable square feet the net area of *all* floor surfaces in such buildings and structures used for such parking or storing, including unroofed, unwalled or partially walled areas typified by the top parking level of a parking structure, and the roofed, unwalled or partially walled areas typified by the intermediate or ground levels of a multistory parking structure or a single-level vehicle shelter.

Stations to be reported: *none.*

Note: Related facilities, such as maintenance, repair, or service shops, storage, administrative offices, etc., which are appropriately classifiable under other type-of-room categories, should be so classified and reported.

700. Other Nonresidential Space

701. Shop. Shop — for manufacturing, maintenance, and repair operations, i.e., *not* used primarily for instruction or research in the shop operations themselves. The term "manufacturing" should be broadly interpreted to include, for example, printing, bookbinding, and photographic processing if the operations are conducted on a somewhat commercial scale.

Stations to be reported on P-1 form: *none.*

Note: Instructional shops are classified as Teaching Lab, and shop type research facilities as Research Lab. Most mimeograph rooms, including those of central stenographic pools, should be classified as Office Serve: but a mimeograph room which is part of the "manufacturing" facilities of the printing department of a university press should be classified as Shop.

702. Storage. Storage — more or less inactive storage, except that centralized storage facilities of, for example, the purchasing department should be classified as Storage, even though much of the material is "in transit."

Stations to be reported on P-1 form: *none.*

Note: Refrigerated food storage is classified as Food Serv, and controlled environment storage related to laboratories is classified as either T Lab Serv or Research Lab, according to its primary use.

703. Field Bldg. Field buildings — *all* net floor areas of barns and other animal shelters; sheds and other structures for the handling, storage, and/or protection of farm produce, supplies, tools, and vehicles; and other structures typically (but not necessarily) of light frame construction with unfinished interiors—i.e., structures which are characteristic of (but not confined to) agricultural field activities, generally (but not always) located outside the central campus, and related more to the scope and scale of field operations than to the character and magnitude of the instructional program.

Note: This is an awkward and difficult-to-apply category. In the first place, despite its name, it must often be applied as a type of *room.* (If part of a field *building* has been finished and equipped as, for example, offices or research labs, then those areas should be so classified and only the remaining part of the building should be classified as Field Bldg.) In the second place, not all buildings located in fields are necessarily Field Bldg space, and not all Field Bldg space is necessarily located in fields. The principal *purpose* of this category is, however, fairly simple. First, it is intended primarily for the campuses with agricultural departments and installations. Second, it is intended as a means of improving the comparability of total-net-floor-area figures for those campuses and for those agricultural departments by excluding the Field Bldg floor areas from certain analyses. (At Davis, for example, there are hundreds of thousands of square feet of field building space, the extent of which is completely unrelated to either the number of students or the number of faculty members, even in the case of the department to which the space is assigned.)

Most of the complications arise where there seem to be nonagricultural applications for this category, as at the Richmond (Engineering) Field Station. Perhaps some of the difficulties can be avoided if, in nonagricultural applications, this category is applied as if it means only the type of small, light frame secondary building commonly referred to as a shed.

In any event, it should be noted that headhouses and other such structures related to greenhouses are classified as part of the category Greenhouse (see 203).

704. Misc. Miscellaneous—the inevitable necessary "catchall" for actively used rooms that do not fit any other category. This category should, however, be used only as a desperate last resort. Quite often, straining to fit another category is a lesser evil than using this category.

Stations to be reported on P-1 form: *none.*

Note: Column 7 should include a brief indication of the character of every room classified as Misc. (In the final editing of all these reports immediately prior to the IBM operations, an effort will be made to establish additional categories for any specific types of Misc rooms that occur in significant amounts at two or more campuses. Note, however, that the statement just made can not reasonably be interpreted as an open invitation to use this category in a mere case of doubt.)

705. Inactive. Inactive rooms—rooms not in use. (See also 706—Alteration.)

Stations to be reported on P-1 form: *none.*

Note: If the room is not in use in the fall term, it is to be reported *in column 2* as Inactive. This does *not* in any way preclude the listing of a specific department *in column 3.* (In fact, the entry Unassigned should not be made in column 3 if any department still regards itself as the "proprietor" of the room.)

706. Alteration. Alteration — any room in the process of being a altered, converted (even "reconverted" if it's really at least the *second* time), or rehabilitated to the extent that it is of essentially no use for the fall term.

Stations to be reported on form P-1: *none.*

800. Hospital

Applicable to University of California.

900. *Residential Facilities*

Note: A standard classification system applicable to residence halls and other residential facilities has not yet been developed. If such facilities exist as part of a building which is included in the present survey, an exception to the general instructions will be made and the general category entry Residential will be made in column 2 of form P-1. (Note that this statement does *not* apply to home-management laboratories and demonstration homes for home economics departments, the total net floor area of such facilities being classified as T Lab Serv—see 107.) A one-line set of entries can be used to summarize such areas, and no stations need to be reported.

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